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RELIQUIÆ AQUITANICÆ;

BEING CONTRIBUTIONS TO

THE ARCHÆOLOGY AND PALÆONTOLOGY

OF

PÉRIGORD

AND

THE ADJOINING PROVINCES OF SOUTHERN FRANCE.

BY

EDOUARD LARTET AND HENRY CHRISTY.

EDITED BY

THOMAS RUPERT JONES, F.R.S., F.G.S., &c.,
PROFESSOR OF GEOLOGY, ROYAL MILITARY AND STAFF COLLEGES, SANDHURST.

ILLUSTRATED WITH 87 PLATES, 3 MAPS, AND 132 WOODCUTS.

1865–75.

LONDON:
WILLIAMS & NORGATE, 14 HENRIETTA STREET, COVENT GARDEN, AND
20 SOUTH FREDERICK STREET, EDINBURGH.

PARIS: J. B. BAILLIÈRE & FILS, RUE HAUTEFEUILLE.
LEIPSIC: F. A. BROCKHAUS.

1875.

PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.

PREFATORY NOTICE.

This Work was commenced under circumstances very different from those under which it is to be carried on.

The results of the researches in the Valley of the Dordogne, which the late Henry Christy ardently prosecuted, liberally providing for the cost, and combining his own active exertions and experience with the labours and counsels of friends, must now be almost wholly described by another pen than his.

He was carried off, in the midst of his self-imposed and well-directed work, by acute illness, brought on by over-exertion in a visit to the Belgian Bone-caves, not long after the first few sheets of this Book had been put into the Printer's hand.

He had arranged its style and mode of publication; very many Plates had been drawn and lithographed in Paris under his own and M. Lartet's superintendence; descriptions of some few of these had been prepared by him; and a general notice of the relationship held by the Stone Implements and other objects found in the Caves of Dordogne to the Implements and usages of existing savage life and of prehistoric people, which he had already communicated to the Ethnological Society, had been re-arranged by him for the present Work.

On his friend and fellow-worker, M. E. Lartet, falls, therefore, the labour of preparing a very much greater portion of this Work than was originally contemplated, although much of

the Descriptions and nearly all the general and special considerations on archæological and zoological subjects were already undertaken by him.

A desire to fulfil the earnest wishes of his departed friend, and a true appreciation of the value of Mr. Christy's researches and their results, urge M. Lartet to persevere in carrying out as far as is now possible the original intentions regarding this Book.

In this he is supported by the goodwill and aid of friends, glad to join him in carrying on a useful work, which, though not so largely comprehensive as was once intended, will be a fit and lasting memorial of the Energy, Liberality, and Love of Science which originated its design, collected its materials, and furnished the means for its completion.

M. Penguilly l'Haridon (Director of the Musée d'Artillerie), Mr. John Evans, F.R.S., Mr. A. W. Franks, Dir.S.A., Mr. W. Tipping, F.S.A., and Professor T. Rupert Jones, F.G.S., have promised their assistance in several matters; the last-named will edit the Work; and Mr. Henry Christy's Executors, desirous of fully carrying out the last wishes of their Brother, are resolved to give every assistance in producing the Book in the style he contemplated.

November 1, 1865.

EDITORIAL NOTE.

The publication of this Serial Work, descriptive of the Implements, Bones, &c. found by MM. Henry Christy and Edouard Lartet in the Caves of the Vezère (Dordogne), France, has again met with a sad and unexpected interruption from the Death of M. Lartet and the Troubles of the French War.

At first intended to embrace a considerable portion of the Cave Relics of the whole Province of Aquitaine, the scope of this Work was necessarily limited after the lamented Death of Mr. Henry Christy (May 4th, 1865), the enthusiastic fellow-worker with M. Lartet in the Exploration of the Caves, and the originator of this Book,—it being then decided that the specimens already collected at Mr. H. Christy's expense should form the main basis of the Essays and Descriptions.

The great loss which Palæontologists and Naturalists in general have suffered in the Decease of M. E. Lartet affects us also very heavily, and, besides calling for our sincere sympathy with his afflicted Family, has deprived us of still another valued Friend and able Coadjutor.

The lamented M. Lartet had in 1865 cheerfully undertaken the labour of fulfilling all that, from the loss of his friend and fellow-worker, H. Christy, had fallen upon him to do, in carrying out as far as possible the original intentions regarding the '**Reliquiæ Aquitanicæ.**'

Conscientiously and with loving care he fulfilled this melancholy, but congenial, task, though much interrupted by ill-health and family affliction—until, seriously invalided, and deeply

affected by the disasters of his Country, he retired from Paris in the dismal autumn of 1870, and was struck by Apoplexy at his country residence at Seissan (Gers), January 28, 1871.

Far too much of his great store of knowledge has gone with him! Beyond what he had already given to the world in his published papers, but little remains in any thing approaching a complete form in MS. Whatever can be made available will doubtless by the filial care of M. Louis Lartet be brought to light.

The Executors and Friends of the late Henry Christy are desirous of speedily and worthily completing the '**Reliquiæ Aquitanicæ**' in accordance with the intentions of the Authors; and with the aid of Friends at home, and of M. Louis Lartet, M. Alphonse Milne-Edwards, M. Sauvage, and other Fellow-workers in France, they will proceed with the work as expeditiously as possible.

Owing to the melancholy events above referred to, there will be fewer Parts published than originally contemplated.

February 1873.

PREFACE.

The Description of the old Aquitanian Caves and their Contents, in a book worthy of the subject, useful to Anthropologist and Archæologist, and within the reach of teacher and learner, was the well known intention of the late Henry Christy; and he originated this Work with the hearty cooperation of his friend Edouard Lartet, whose death, alas! we also deplore.

The death of one of these enthusiastic and devoted friends hindered an exhaustive examination of the Caves in Aquitania; and the description of what had been collected in the Caves already explored has been sadly curtailed by M. Lartet's decease.

Besides the extended illustration of prehistoric objects, to which H. Christy's further research in this district, by careful excavation of the Caves, would have given rise, we have lost a valuable account of the Mammalian Remains, which M. Lartet so well knew how to describe, comparing them with both extinct and existing allies.

We have had occasion already, in our Prefatory Notice, of November 1865, and Editorial Note, of February 1873, to explain the limitation of scope in this Work, and the unavoidable delays in its publication. We need only thus allude to the melancholy events causing these alterations in its plan and interruptions in its progress.

Many explorers in France have briefly noticed or described at large the

results of their search in some of the Caves not excavated or not fully examined by MM. Christy and Lartet; they have enriched their museums with numerous and often choice relics of the Cave-folk, and have published thoughtful and philosophic memoirs on the conditions and habits of that early people. The Bones, also, of Birds and Fishes found in the Caves have been carefully treated of by Dr. A. Milne-Edwards and Dr. Sauvage, in the 'Reliquiæ Aquitanicæ' and elsewhere. But the Mammalian Remains are still undescribed; for M. Lartet's notes were left in too fragmentary and unfinished a state to yield a continuous memoir, and no other palæontologist as yet has turned his attention to the subject.

M. Lartet's catalogue of these Mammals, however,—his note on the *Ovibos* (reprinted),—and numerous remarks by him on other members of the Cave Fauna, are to be found in the 'Reliquiæ Aquitanicæ.'

The Caves which were actually examined are treated of by both E. Lartet and H. Christy, in this Book; and more fully by Mr. John Evans. M. Louis Lartet has given a detailed description of Cro-Magnon; and Dr. Hamy has noticed some points in the Rock-shelter of Laugerie Basse. A full account of the geological surroundings of the Caves of the Vézère is also given.

Of the Cave-dwellers themselves much is reported in this Work. Such of their Skulls and other Bones as have been met with are described in full by Dr. Pruner-Bey, Dr. Broca, and Dr. Hamy, and commented on by M. de Quatrefages. Their features, stature, characters, and race have been discussed. Their habits have been elucidated in the descriptions of their Weapons and other Implements adapted for shooting or darting, stabbing, clubbing, cutting, chopping, flensing, scraping, smoothing, grinding, boring, drilling, and other work, wanted either in peace or war, in hunting and fishing, in domestic operations, and in designing the works of art which so markedly characterized this peculiar people of Western Europe. Their cooking-stones, hearths, and mortars; their bodkins

and sewing-needles; their personal ornaments and amulets, perforated for stringing, their whistling instruments*, and their batons, possibly distinctive of rank and dignity, have received much attention, as the memoirs and descriptions by E. Lartet in particular will show. Even their Owner-marks, Tally-scores, and probable Gambling-tools have been recognized and described in this Work. How they made their many Implements of Flint, and why that stone was good for their purpose, has also been explained.

The differences of Cave from Cave, in their earliest animal inhabitants, and in the style of living of their subsequent Human occupants, have been noticed, according to the evidence yielded by the osseous relics found therein, by the several kinds of stone and other Implements, and by the presence or absence of engraving and carved ornament on those of bone and antler.

Much light has been thrown on some points of the domestic economy of these Aborigines of Périgord by comparison of their Implements with those used by the North-American Indians, and by Savages of other parts of the world. Among the many friends who have indicated points of interest in this direction, Mr. Anderson, of Vancouver, Dr. Brown, and Mr. Lloyd, C.E., have greatly aided us. Mr. Anderson has also discussed the important bearings that the characters and conditions of these Cave Relics have in the consideration of their relative and positive age—a subject treated by M. E. Lartet especially with reference to the association of the Reindeer, Musk-ox, Mammoth, Cave-Lion, and other primæval animals with these old inhabitants of France.

In treating of the Reindeer, the constant associate of the Cave-folk of Périgord, we have been indebted for much information to Alex. Anderson, of Vancouver, the late N. L. Austen, and T. G. B. Lloyd, C.E., each personally acquainted with this animal in either Europe or America. It is sad to remember

* A musical pipe, made of a hollow bone, found among some relics of the Cave-folk, has also been described and commented on by M. Piette.

that the promising young Naturalist Mr. N. Laurence Austen died so soon after communicating his valuable notes to the 'RELIQUIÆ AQUITANICÆ.'

We must not here enumerate all whose names appear in the following pages as helpers in the elucidation of prehistoric life. To few, however, do we owe so much as to the late Mr. T. K. GAY, who was cut off from among us at an early age by consumption, deeply regretted by all who knew him. Earnest, enlightened, and courteous, he was ever ready to task his memory, or to search Voyages and Travels for analogous facts in the history of early and of savage peoples, and to apply his intimate knowledge of the CHRISTY COLLECTION to the elucidation of the primæval objects treated of in the 'RELIQUIÆ AQUITANICÆ.' To his willing and clever pencil also we owe many original sketches, besides copies of useful illustrations.

In bringing together and arranging the varied materials supplied by friends at home and abroad, desirous of making the 'RELIQUIÆ AQUITANICÆ' thoroughly useful in Archæology and Anthropology, the directing counsels of Mr. A. W. FRANKS, F.R.S., have been constant and efficient, like his courtesy and great knowledge. The revision of the proofs, also, has profited not only by his care, but by the experience and accuracy of our friend Mr. JOHN EVANS, F.R.S.

Lastly it must be noticed that the resolution of Mr. HENRY CHRISTY'S EXECUTORS, "desirous of fully carrying out the last wishes of their Brother, to give every assistance in producing the Book in the style he contemplated," has been amply and generously fulfilled; and we believe the hope, formerly expressed, has also been fulfilled,—namely, that, supported by the goodwill and aid of friends, this useful work, though not so largely comprehensive as was once intended, will be a fit and lasting memorial of him whose Energy, Liberality, and Love of Science originated its design, collected its materials, and furnished the means for its completion.

T. RUPERT JONES, *September 7th*, 1875.

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ESSAYS AND MEMOIRS.

RELIQUIÆ AQUITANICÆ.

I.

AQUITANIA—FEATURES OF THE DORDOGNE DISTRICT—THE CAVES IN THE VALLEY OF THE VEZÈRE AND THEIR CONTENTS—INFILLING OF BONE-CAVES—RELATIVE CHRONOLOGY OF BONE-CAVES.

Aquitania.—In explanation of the Latinized title of this Work, the Authors have to mention that, at various periods of History, the geographical term "Aquitaine" has been applied to a region of Gaul and France differently limited at different times.

Before the Roman Conquest of Gaul, Aquitaine comprised only the conquered lands lying between the Pyrenees, the Garonne, and the Ocean. It was partly subjected to the Romans by the younger Crassus, one of Cæsar's lieutenants; but the Roman domination was not definitely established until after the victories of Messala, who, under Augustus, repressed the revolts of the Aquitanians.

Augustus, on the new division that he made of the Provinces of Gaul, considerably enlarged Aquitania, at the expense of Celtica, and settled the Cévennes and the Loire as its boundaries. The new Province, thus constituted, was subdivided into the First, Second, and Third Aquitania,—the last, more often designated by the name "Novempopulania," comprising almost entirely the territory of the original Aquitania, such as it was before the Conquest. This division continued to exist until the invasion of the Barbarians. The Visigoths, who located themselves in Aquitaine in 419, were dispossessed of it in 507 by the French King Clovis; and his immediate successors modified from time to time its boundaries.

In the Sixth Century the irruption and settling of the Basques, Vascons, or Gascons gave the name of "Gascony" to a large portion of Novempopulania or

Aquitania Tertia; and detached portions of the two other Aquitaines subsequently took the names of Upper and Lower Guyenne, supposed to be a corrupted form of the name Aquitaine.

Still later, a considerable part of the three Aquitaines, thus dismembered and partitioned, sometimes belonging to the Crown of France, sometimes held by the Kings of England, long remained the theatre of international strife, which did not cease until the middle of the 15th century, when all the territories for the possession of which the English had so long struggled in that region were definitely reunited to France.

Considered with reference to the division of France into Provinces, which ceased to exist in 1789, the "Aquitania Prima" of the Romans, which had *Avaricum* (Bourges) for its metropolis, corresponded with the Provinces of Berri, Auvergne, Querey, Gévaudan, Albigeois, Limousin, Rouergue, and Vélay. Aquitania Secunda, the metropolis of which was *Burdigala* (Bordeaux), comprised the Provinces of Angoumois, Bordelais, Médoc, Agenais, Périgord, Poitou, and Saintonge. Aquitania Tertia, or Novempopulania, having *Elusa* (Eauze) for its metropolis, corresponded only with the Provinces of Béarn and Bigorre and a large part of Gascony.

Although the archæological researches of which this Work is intended to give some account have been carried out only at some circumscribed points of the different provinces belonging to the great Aquitania, the Authors have found it convenient, without explicitly determining the limits of exploration, to adopt this wide geographical title.

Features of the Dordogne District.—This Work will be principally devoted to the description, accompanied by Figures, of the more interesting materials which have been collected in that part of Périgord (the territory of the ancient Petrocorii of Celtica) which forms at present the Arrondissement of Sarlat, in the Département of Dordogne.

This country is now traversed by the railroad from Paris to Agen (Central Line), passing by Orléans, Chateauroux, Limoges, and Périgueux. After passing the last-named town about eighteen miles, and descending to the valley of the Vezère, between the Stations of Miremont and Les Eyzies, the eye is struck by the sudden change which affects the physical aspect of the country. The two sides of the valley rise in great escarpments of massive rock, more or less interrupted by ancient falls. Their summit is usually crowned with projecting cornices, below which are great horizontal niches or hollow flutings. These great flutings are

strikingly evident at the same level on the two sides of the valley, where the escarpments overlook the river, and where they are continued in the rocks bordering the lateral valleys, down which small streams run into the Vezère. Hence the first impression on the observer is that these are great lines of erosion, due to the rapid movement and long-continued passage of a vast mass of water that had filled both the principal and the accessory valleys. Further reflection, however, and a more attentive examination soon suggest a more reasonable explanation.

When we approach the foot of these cliffs, it is readily seen that these masses of rock, referable geologically to the Cretaceous Formation, present horizontal beds of a somewhat various structure and composition. Some of the layers are more susceptible than others of being attacked by the atmospheric agents which degrade and eat into their exposed surfaces, whilst the harder intervening layers resist better and remain as projections. Hence result the projecting ledges and the long hollow lines, which, necessarily corresponding in level on the two sides of the valley, suggest at first sight the action of water.

Passing near these cliffs after a thaw,—or even, in summer, at a time when intense heat has followed moist and rainy weather, one may see both large thin plates and small flakes and films of the rock scale off from the beds where the hollow flutings are being formed; and these scalings accumulate all along at the foot of the escarpment, where they are sometimes reconstituted as solid masses by the effect of calcareous infiltrations of the percolating waters.

As for the upper cornices, the bed which supports them being continually diminished by weathering, they project horizontally sometimes far forward; and when by their weight they are forced to break off, they fall and lie at the foot of the cliff, where some may be now observed that have been lying there for centuries.

Fig. 1.

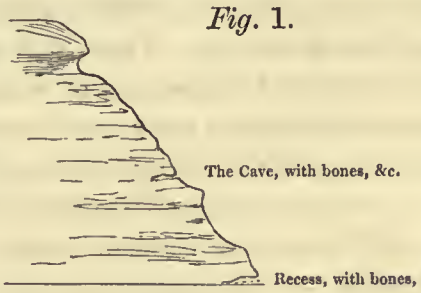
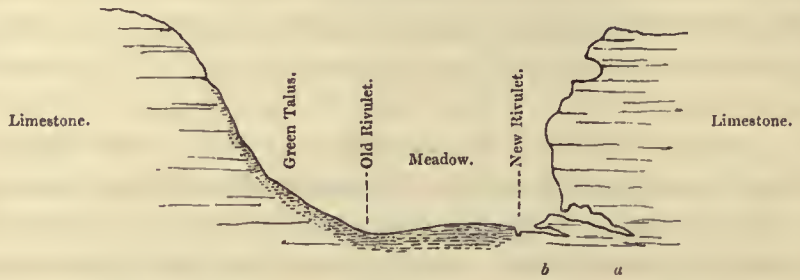


Diagram Profile of the Limestone Escarpment of Le Moustier, from the South-west, about 190 *feet high.*

It is thus possible to conceive that atmospheric causes, however gently operating, may have powerfully contributed, in long series of ages, to the widening of some valleys—and this independently of the action of water, which indeed in many cases is limited to filling up the bottoms of the valleys.

The great rocky masses which border the valley of the Vezère, and those enclosing the adjacent valleys, are also hollowed with numerous cavities, which

Fig. 2.



(*a*) Cave, with Bones, &c. (*b*) Recess, with Bones, &c.

Diagram Profile of the Gorge d'Enfer, a lateral Valley on the right Bank of the Vezère.

the hand of Man has often modified and enlarged. For here, as in many other countries, the caves, recesses, and other irregular openings, so frequent in calcareous rocks, have been without doubt utilized for temporary shelter, and even for permanent residence. This habit, more general when the people of this country were exposed to constant war and sudden attacks, became less usual as political and social security increased.

The Rock of Tayac, of which frequent mention is made in the history of the wars between the English and French in the 14th and 15th centuries, was at that time a kind of fortress entirely hollowed out of the rock, and it sustained more than one siege. There still exist on the right bank of the Vezère remains of this mediæval fortress, now scarcely accessible, in one of the escarpments at the foot of which we have been led to make some of our archæological researches, though of course relating to a very different period.

At the present time, the occupation of rocks for purposes of residence, in this part of Périgord, is become rarer; and nearly everywhere where it still obtains recourse is also had habitually to additions of masonry, rendering the residence more healthy and more comfortable.

The Caves and their Contents.—The Authors have already had occasion* to treat of several Caves and Rockshelters, situated in the united Communes

* Revue Archéologique, April 1864, p. 257 *et seq.*

of Les Eyzies and Tayac, and in the neighbouring Communes of Turzac and Peyzac, all belonging to the Arrondissement of Sarlat; and further descriptions of them and their contents will be given in the sequel.

At present we will only mention that these different Stations, although within the chronological divisions of *the Age of simply worked stone, without the accompaniment of domestic animals*, do not present a uniformity in the products of human industry collected there.

In fact, at Laugerie Haute (in the Commune of Tayac), on the right bank of the Vezère, where worked flints, like lance-heads, were comparatively abundant, the arrow-heads or harpoon-heads of Reindeer-horn were almost entirely absent; whilst the latter implements are found in great numbers at Laugerie Basse, at La Madelaine, and even at Les Eyzies, where scarcely any of the flint lance-heads have been met with.

The figures of animals engraved or sculptured on stone, on bone, or on Reindeer-horn, have appeared only at three Stations as yet, namely, Les Eyzies, Laugerie Basse, and La Madelaine.

The cave of Moustier, which has yielded worked flints of a special type, and exceptional with respect to the whole range of our explorations, has also furnished a large number of specimens approaching forms frequent in the "Diluvium" of St. Acheul and Abbeville. On the other hand, there has not been found there a single worked bone, or any engraved or sculptured animal-figure.

Nevertheless the Fauna of the several Stations appears to be almost the same; only at Moustier the Reindeer is less dominant numerically than at the two Laugeries, at La Madelaine, and at Les Eyzies.

At all the five Stations have been found separate plates of the molar teeth of Elephant (*Elephas primigenius*), the occurrence of which, evidently connected with intentional introduction, we have not yet sought to explain. At two (Les Eyzies and La Madelaine) worked ivory has been met with; at Laugerie Basse a portion of the pelvis of an Elephant was found.

As palæontological peculiarities special to a single locality, we may mention:—in the Moustier Cave, the half of a lower jaw of *Hyæna*; at Les Eyzies, a metacarpal of a large *Felis* (*F. spelæa*?) bearing the marks of scrapings, such as are often found on the bones of the Herbivores eaten by the natives; at Laugerie Haute we have two molars of the Great Irish Deer (*Cervus euryceros* vel *Megaceros Hibernicus*); and at Laugerie Basse the phalanges of a great Bear, marked with notches made by a cutting instrument.

Neither in the two Caves of Les Eyzies and Moustier, nor in the three Rock-shelters of La Madelaine and the two Laugeries, have any gnawed bones occurred, excepting one specimen at La Madelaine, namely the head of the femur of a Horse, bearing slight impressions of the sharp teeth of a young Carnivore.

Hence we may suppose that the natives who congregated in these caverns and under these rockshelters had the means of closing them up, and preventing the access of beasts of prey, such as certainly lived at that time in the country, for their existence is proved by tolerably numerous remains of Wolves and Foxes in the different localities explored by us.

There is also another peculiarity meriting notice. This is the almost complete absence of the back-bones of Ox and Horse in the several Stations mentioned above, except at La Madelaine, where several dorsal and lumbar vertebræ of a young Aurochs (?) have been collected. We may thence infer that the large animals (Oxen and Horses), after having been slaughtered by the aboriginal huntsmen, were cut up on the spot, and that only the extremities, with their fleshy parts and marrow-bones, were carried away*.

Of animals of less size, especially the Reindeer, the back-bones are found in considerable numbers at all the Stations; and at the cave of Les Eyzies we have many times observed the dorsal vertebræ remaining in series: hence we may presume that these animals were carried thither entire.

Of all the animals the heads seem to have been always brought to the places of meeting, probably for the sake of the brain; for all are broken, and their fragments only have been met with.

Lastly, no bone referable to a Domestic Animal has been found in either of the five Stations above mentioned; and among the countless thousands of worked flints, of most varied types, which have been as yet collected, not one has presented traces of intentional polish on any of its faces. These two circumstances, combined with the constant presence of the Reindeer, suffice to distinguish definitely this First Period of the Age of Stone simply worked† from the Second

* In regard to Aurignac, we have attributed (Ann. Sc. Nat., 1861) the total disappearance of the vertebræ of Rhinoceros, Aurochs, and Horse to the voracity of the Hyænas. The explanation now offered may be more to the purpose.

† To affirm absolutely that the Men of the Period of simply worked Stone did not *know* how to polish the Stones which they fashioned into arms, implements, and instruments of diverse forms would be an imprudent and not well-founded assertion. How, indeed, is it to be explained that the people who gave to their implements or weapons of stone forms so varied and often elegant,—who finished them off for ordinary purposes with oftentimes so delicate a touch,—who, on the other hand, took the trouble to give to their needles of bone,

Period, when polished stone comes before us together with domestic animals and habits of agriculture quite unknown to the earlier natives.

This is a striking contrast, involving the supposition of there having been a great lapse of time between these two periods. For, if the rapid change of manners and customs might be explained by the invasion of a people more advanced in civilization, and by the extermination of the conquered, this would not account for the sudden disappearance of a species of animal,—the Reindeer for example, of which we do not find any trace, either in the oldest Lake-dwellings of Switzerland, or in the caves of the same age, containing polished stones and remains of domestic animals, or even in the earliest of the Dolmens.

Infilling of Bone-caves.—There was a time when Geologists, at variance as to the manner in which the introduction of Mammalian Remains into Caves has been effected, proposed only two explanations, of very different tendencies.

Some thought, with Dr. Buckland, that the caverns must have served during a long time for the haunt of great Carnivores, especially Hyænas, which had successively dragged into them the entire or dismembered carcases of their prey. In certain cases, indeed, the evidence agrees well enough with this hypothesis.

Another opinion, proposed and perseveringly held by Constant Prévost, attributed, in very great part, to running and torrential waters the transport and accumulation of the cave-bones.

This second hypothesis is more than probable when it concerns the great

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and instruments made of Reindeer-horn, the finest polish,—who engraved and carved these same bones with taste and remarkable art,—how can we explain, we say, that they had not divined the art of polishing stones, especially when they knew (we have proofs of it) how to hollow them, pierce them, to cut figures of animals on them, and even to produce on them, by rubbing, intended for other effects, the accident of polish, alone sufficient to reveal to them the process? Among different peoples of Antiquity there have always been some long-respected traditions, sacred usages, and mystic prohibitions, the origin of which, and their signification, remain unknown to us. Among the Egyptians the use of stone, to the exclusion of metal, was always connected with certain religious and funereal practices. The Biblical precept (Exodus, xx. 25) prohibited, in the building of the primitive altars, the use or contact of metal, as an abomination. In our Western Europe the Menhirs, the Dolmens, the Cromlechs, and other monuments of large stones, the national origin of which is still obscure, attest, by the natural state of the blocks used in them, that their constructors abstained altogether from all auxiliary art, and even from the mere squaring of the stones, while, notwithstanding, they did often associate with them, as consecrated votive offerings, arms, implements, and amulets of *perfectly polished* stone.

underground cavities, of difficult access, or having no external communication but by fissures and cracks, more or less vertical, but large enough to give passage to the streams carrying and depositing the bones of animals.

Later researches have obliged us to recognize the intervention of Man, to a great extent, and in some cases exclusively, in the accumulation of the organic débris in a large number of caverns, inasmuch as, nearly always, the same deposits contain works of industry, fragments of charcoal and of burnt bones, as well as other signs of a more or less prolonged habitation by Man.

Relative Chronology of Bone-caves.—By the comparative examination of the material, the form, and style of the works of industry, together with the study of the specific characters recognizable in the Mammalian bones found with them, we have been able to refer these organic deposits to different successive periods, thus forming a kind of Relative Chronology of the Bone-caves.

Thus, as it has been already said, it is generally accepted that the infilling of those caverns in which are found polished stone axes, accompanied only by bones of domestic animals, is of a more recent date than that of the deposits in certain other caves where domestic animals are wanting, where there has been only simply worked, not polished, flint, and where there are abundant remains of extinct or emigrated Mammals, among others the Reindeer.

If sometimes, to distinguish the latter caves, we have designated them as being of the *Reindeer Age*, simply because the bones of this animal have there a great numerical predominance, we have not thereby intended to limit the local existence of the Reindeer to the particular epoch to which these caverns appear to belong. The bones of Reindeer have, indeed, been observed, though in smaller numbers, in other caves, reputed older because, with works of industry somewhat different, there is also an association of the remains of the large Pachyderms, the extinction of which is usually referred to a more distant period.

It is known also that Reindeer-bones have been collected from different beds of "Diluvium," or Quaternary Alluviums of the beds of valleys. That they have come down to the present time in very limited number only, as also those of other Mammals of middling and small size, may perhaps be accounted for by their offering less resistance than those of the great Pachyderms to the chances of destruction from the multiplied shocks of the gravel and shingle among which they would be hurried in rapid torrents.

Mr. Prestwich* has indeed cited the remains of Reindeer associated with worked flints in the Quaternary beds of the "Drift" at Bedford, in England, at Menchecourt near Abbeville, and at Clichy near Paris, in France. More recently we have seen a well-preserved bone, undoubtedly referable to the Reindeer, from the High-level Valley-gravels of St. Acheul†. The Reindeer had also been found in this gravel of the Valley of the Oise, at Viry-Noureuil near Chauny (Aisne), where M. l'Abbé Lambert collected a good number of teeth and bones of *Elephas antiquus*, *Elephas primigenius*, *Rhinoceros tichorhinus*, *Megaceros Hibernicus*, *Ovibos moschatus*, *Hyæna spelæa*, &c., as well as the remains of a small Bear which certainly was not (although so stated) the Great Cave-bear (*Ursus spelæus*).

We will remark, further, that remains of Reindeer have been noticed by our lamented and esteemed friend Dr. Falconer, in his Memoir on the Bone-caves in the Peninsula of Gower in South Wales, where the fauna seems to be comparatively very ancient, from the considerable proportion there met with of bones of *Rhinoceros hemitœchus* and *Elephas antiquus*—two species which, in the opinion of the great palæontologist we are citing, have characterized especially the earlier part of the Quaternary Period‡.

As for the parallelism that has been thought to be established between the organic deposits of the Caverns and the fossiliferous beds of the "Diluvium," it has no real support but the affinity found on comparison of the palæontological characters. If some are inclined to attribute to the works of human industry found in the "Diluvium," or "Drift," a date more ancient than to those occurring in Caves with a similar association of animal remains, we are obliged to remark that such a proposition, expressed as a systematic generalization, is not justifiable in any point of view. It is not illogical to suppose that the men who manufactured the worked flints of St. Acheul, Abbeville, Hoxne, Bedford, &c., may, at one time or another, have inhabited caverns, where they would have left traces of their sojourn, whether in the products of their industry or in the remains of the animals they had eaten.

Caves were in truth the first shelter which primitive Man would choose, whether

* "On the Geological Position and Age of the Flint-implement-bearing Beds, &c.," Phil. Trans. 1864, Part II. pp. 94, 254. See also Buteux, 'Esquisse Géol. Dép. Somme,' 1849, pp. 101, 102.

† A *Calcaneum* of a Reindeer was obtained at St. Acheul by Mr. H. Christy on one of his latest visits there, in company with M. L. Lartet. The latter, also, brought thence two plates of a molar of *Elephas antiquus*. Since then M. E. Lartet has had remains of Reindeer from the "Drift" of the Oise, near Compiègne.

‡ Falconer, "On the Ossiferous Caves of the Peninsula of Gower, &c.," Quart. Journ. Geol. Soc. vol. xvi.

driven by instinct or determined by reason. There has been with all people of antiquity a tradition that the first men inhabited caves. This remembrance has been preserved among the Chinese and the Egyptians*. Plato observes that Homer has attributed this kind of life to the savages of Sicily; and he himself says the same of the ancient inhabitants of Greece. It is apropos of the latter that Pliny says, "formerly caves served them for houses"†. Pliny also cites the Troglodytes, or cave-dwellers, among the Æthiopians, and in another region of Africa. He adds that it had been the custom also among the Scythians, those Barbarians who, according to Diodorus Siculus, pretended to an origin of higher antiquity than the Greeks or even the Egyptians. Lastly, it is written in the Scandinavian 'Edda' that, "during the combats of the Gods and Giants, Men sighed and groaned at the entrances of their caves"‡.

E. L.

* Boulanger, 'L'Antiquité dévoilée par les usages,' &c., liv. vi. ch. 11, 1777.

† "Antea specus erant pro domibus."—*Plin.* Nat. Hist. lib. vii. c. 57.

‡ Edda, Fab. xxxii.

II.

THE PREHISTORIC CAVE-DWELLERS OF SOUTHERN FRANCE. I. STONE IMPLEMENTS. —II. THE DORDOGNE CAVES.—III. THE REINDEER-PERIOD.

§ I. *Stone Implements: their wide distribution.*—We may repeat here what has been already stated by one of us elsewhere*. Man's existence upon earth is to be traced in almost all countries by the relics of one of his primitive industries—implements of stone. One of his primitive industries, we say, because it is very probable that the use of wood may, in many cases, have preceded that of stone, although, from its perishable nature, no very ancient examples have come down to us to serve as proofs.

The term primitive may be fairly applied to these works, because we have broad ground for believing that the various races of men (though at widely different periods) have passed through what has been designated the "Age of Stone,"—and the more so, because we have but one known example, and that comparatively recent, in which man, after he has attained to the use of metal, has returned to implements of stone†.

These Implements of Stone are to be regarded as indicating a grade of civilization rather than any definite antiquity; and although in some countries there are clear evidences, so to say, of an overlap with the Age of Bronze, and that the use of metal has come in gradually, and the use of stone has gradually gone out, yet there is no reason to conclude that both have been long or generally employed together for the same purposes.

Geographically this primitive industry in stone is to be traced over the whole of Europe, from the wilds of Scandinavia to the plain of Marathon, and from the eastern shores of the Atlantic to the steppes of Russia. In Asia it is present in the desolate valleys of Mount Sinai, the grottos of Bethlehem, the caves of Lebanon, and on the plain of Babylon, through the breadth of British India, throughout the Indian Archipelago, the northern isles of Japan, and on the frozen shores of the Arctic Sea. It is doubtless from want of research that China has not, as yet, afforded proofs of its existence there also. In Africa it is found in Nubia, on

* H. Christy, 'Transactions of the Ethnological Society,' New Series, vol. iii. 1865.

† Namely, the inhabitants of the West Coast of Greenland, in the interval between the destruction of the first Scandinavian colonies and the arrival of the Danish Missionary, Hans Egede, in 1721,—regular intercourse with Europeans having ceased for about 300 years.

the central plateau of the Atlas-ranges, and on their northern and southern slopes, and southward at the Cape of Good Hope. In America its existence is recognized throughout the whole of the northern continent in its length and breadth, from Behring's Straits to the Mexican plateau, and from Western Columbia to the Atlantic shores. In the southern continent it extends from the Cordillera of Peru to Tierra del Fuego, and is met with in the islands of the West Indies, the lowlands of the Amazon and the Orinoko, and the forest fastnesses of Brazil.

Even yet more widely spread in point of time are these mute but indisputable witnesses of man's presence.

To this day the Stone-age lingers on among some of the inhabitants of the shores of the Polar Sea, both in Asia and America, and among the Indians of California and of the Rocky Mountains, the natives of New Caledonia and of the Andaman Islands, and some Australian tribes. Not a century has elapsed since the great majority of the Islanders of the Pacific first acquired, by contact with the outer world, an acquaintance with metals. Nor have four centuries elapsed since the discoverers of America found the inhabitants of the New World, with some slight exception with regard to copper and bronze, totally unacquainted with the use of metal implements.

In the Old World, on the other hand, it is widely different. There, in Europe, in Northern Africa, and throughout the continent of Asia, except at its north-eastern extremity, with one single exception mentioned by Herodotus, history and tradition are alike silent as to Implements of Stone*. In this field of research, therefore, the antiquity of the objects in question must be determined by surrounding circumstances.

Three Prehistoric Periods of the Stone-age.—Subject to many exceptions, the prehistoric implements may be grouped into three great divisions—namely, those of the Surface, the Cave, and the Drift. In the most recent of these, the Surface-period, where the implements are most commonly found in association with the battle-field or the sepulchre, the work of assigning the relative age lies chiefly with the archæologist; and this is to be determined by their types, the presence of other industrial products, or the circumstances under which they are found, though occasionally the associated animal remains give some clue to their antiquity.

* The indications of Stone Knives having been in use among the Hebrews, as supported by the Septuagint version of 'Exodus,' iv. 25, and 'Joshua,' v. 2, and by a Septuagint interpolation in 'Joshua,' xxiv., are fully treated of in Mr. E. B. Tylor's 'Early History of Mankind,' &c., pp. 214 *et seq.*—Ed.

In the next more ancient, or Cave, period, of an age prior to the construction of habitations for the living, or of receptacles for the dead, and in which the traces of other and more advanced industries are but rare, the task of indicating their antiquity falls mainly on the palæontologist, and the fauna (sometimes of animals extinct locally prior to either history or tradition, but whose remains are found in indubitable association with these works of man) is his only certain guide—the more so, as sometimes the types of the implements found on the same spot take a wide range, from those until lately supposed peculiar to the Drift, down to those hitherto assigned to the earlier part of the Surface-period.

In the earliest period—that of the Drift—the Archæologist finds not the slightest trace of other human industry to guide him; and the work of the Palæontologist is less determinate; it rests with the Geologist, by indicating the changes which have occurred in the very land itself, to shadow out the period in the dim distance of that far antiquity when these implements, the undoubted work of human hands, were used and left there by primeval man.

Similarity of Form in Stone Implements.—Here it may not be amiss to remark that, whilst the implements of stone in various countries, and in various periods, differ much one from another, both in form and in skill of construction, and whilst, in some countries, there are various grades, extending over various and widely remote periods of time, there can yet be traced throughout the whole world, from the very earliest to the very latest time, a marvellous coincidence—not merely in the simplest and most primitive, but also in the more complex types; and within a more limited but still wide range, both as regards time and distance, there are, in the more highly finished forms, some most curious resemblances.

In proof of the agreement between simple forms may be cited a lance-head of obsidian, mounted on its shaft, and an unmounted one of flint, both from the dominions of the same sovereign, wide apart in point of distance, but wider still in point of time,—the one still in use by the natives of New Caledonia; the other from the Valley of the Somme, left there by man when the Mammoth yet existed there, when the river-level was seventy feet above its present bed, and when it had not cut out the broad valley through which it now flows. (See figs. 3 and 4, page 14.)

In support of our remark as to the more complex forms, we may note an instrument in use amongst the Polar Esquimaux for scraping skins, one of a similar description from the Reindeer-caves of France, and another from the Drift of St. Acheul. (See figs. 5, 6, 7, page 14.)

Fig. 3.

Fig. 4.

Fig. 5*b*.

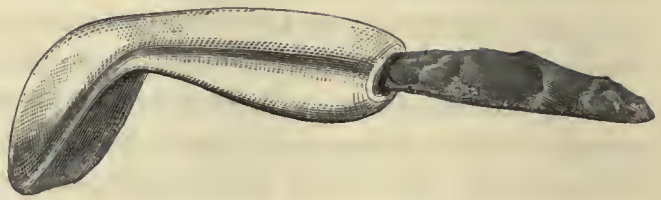

Fig. 5*a*.

Fig. 7.

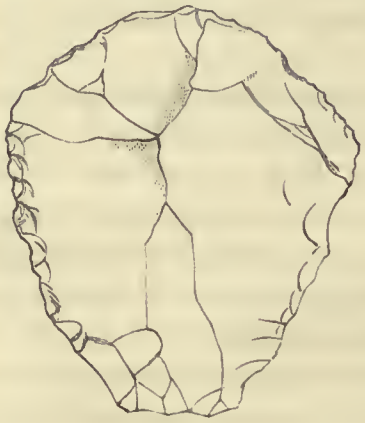

Fig. 6.

Fig. 3. Obsidian Lance-head, mounted on a shaft; from New Caledonia.

Fig. 4. Flint Lance-head; from the Gravel of the Valley of the Somme.

Fig. 5. Scraper of Lydite, mounted in an ivory handle; used by the Esquimaux. (Two views, *a*, *b*.)

Fig. 6. Flint Scraper; from a Cave in Périgord.

Fig. 7. Flint Scraper; from the Gravel of the Valley of the Somme.

[*All reduced to Half-size.*]

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

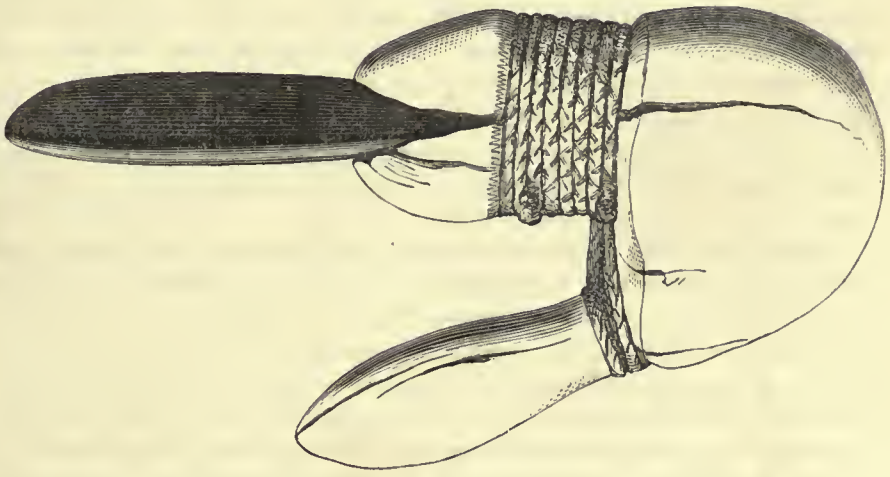

Fig. 8. Polished Axe of Greenstone: British India.

Fig. 9. Polished Axe of Greenstone: England.

Fig. 10. Polished Axe of Greenstone: South America.

Fig. 11. Polished Axe of Basalt: France.

Fig. 12. Polished Axo or Adzo of Greenstone, mounted in a wooden handle: from Solomon Islands, Pacific.

[*All reduced to Half-size.*]

It seems that in a time far remote the Cave-dwellers of Périgord found it convenient to scrape the Reindeer-skins with a form of instrument which the modern Esquimaux finds to be also suited to the same purpose. Of the inhabitants of the Somme Valley, we only know that they also practised the same re-chipping of the flake to give it a rounded or blunted end.

The resemblances existing among the yet more highly finished forms may be illustrated by a polished axe of the so-called "Celtic Period" from France, and others from England, British India, South America, and the Southern Pacific. (See figs. 8–12, page 15.)

Manufacture of Stone Implements.—Owing to the prehistoric antiquity of the flint implements of the Old World, we have no description of how they were made. From the New World, however, we have the direct testimony of an eye-witness as to the manufacture of flaked and chipped weapons in obsidian. The process is described by the old Hispano-American historian, Torquemada, and has been quoted in Mr. E. B. Tylor's 'Anahuac' pp. 331 &c.*; and for an exact and most

* 'Anahuac; or Mexico and the Mexicans,' 8vo, London, 1861. "Some of the old Spanish writers on Mexico give a tolerably full account of the manner in which the Obsidian Knives, &c., were made by the Aztecs." . . . . "Torquemada ('Monarquia Indiana,' Seville, 1615) says, (free translation) 'They had and still have workmen who make knives of a certain black stone or flint, which it is a most wonderful and admirable thing to see them make out of the stone; and the ingenuity which invented this art is much to be praised. They are made and got out of the stone (if one can explain it) in this manner. One of these Indian workmen sits down upon the ground, and takes a piece of this black stone, which is like jet, and hard as flint, and is a stone which might be called precious, more beautiful and brilliant than alabaster or jasper, and so much so that of it are made tablets and mirrors. The piece they take is about 8 inches long or rather more, and as thick as one's leg or rather less, and cylindrical; they have a stick as large as the shaft of a lance, and three cubits or rather more in length; and at the end of it they fasten firmly another piece of wood, 8 inches long, to give weight to this part; then pressing their naked feet together, they hold the stone as with a pair of pincers, or a vice of a carpenter's bench. They take the stick (which is cut off smooth at the end) with both hands, and set it well home against the edges of the front of the stone (y ponenlo a versar con el canto de la frente de la piedra), which also is cut smooth in the part; and then they press it against their breast, and with the force of the pressure there flies off a knife, with its point, and edge on each side, as neatly as if one were to make them of a turnip with a sharp knife, or of iron in the fire. Then they sharpen it on stone, using a bone to give it a very fine edge; and in a very short time these workmen will make more than twenty knives in the aforesaid manner. They come out of the same shape as our barbers' lancets, except they have a rib up the middle, and have a slight graceful curve towards the point. They will cut and shave the hair the first time they are used, at the first cut nearly as well as a steel razor, but they lose their edge at the second cut, and so to finish shaving one's beard or hair, one after another has to be used; though indeed they are cheap, and spoiling them is of no consequence. Many Spaniards, both regular and secular clergy, have been shaved with them, especially at the beginning of the colonization of these realms,

interesting narrative of how the much more difficult and complicated chipped weapons are fabricated by the Indians of California, we are indebted to Sir Charles Lyell, to whom it was recently communicated by Mr. Cabot, who had it from an eye-witness. The communication is entitled, "An Account, by an Actual Observer in California, of the Process of making Stone Arrow-heads, by the Shasta Indians, who still commonly use them."

"The Indian seated himself on the floor, and, laying the stone anvil upon his knee, with one blow of his agate chisel he separated the obsidian pebble into two parts; then, giving a blow to the fractured side, he split off a slab a quarter of an inch in thickness. Holding the piece against his anvil with the thumb and finger of his left hand, he commenced a series of continuous blows, every one of which chipped off fragments of the brittle substance. It gradually seemed to acquire shape. After finishing the base of the arrow-head (the whole being little over an inch in length), he began striking gentle blows, every one of which I expected would break it in pieces. Yet such was his adroit application, his skill and dexterity, that in little over an hour he produced a perfect obsidian arrow-head.

"I then requested him to carve one from the remains of a broken bottle, which, after two failures, he succeeded in doing. He gave as a reason for his ill-success, that he did not understand the grain of the glass. No sculptor ever handled a chisel with greater precision, or more carefully measured the weight and effect of every blow, than did this ingenious Indian; for even among them arrow-making is a distinct profession, in which few attain excellence. In a moment all I had read of the hardening of copper for the working of flint axes, etc., vanished before this simplest mechanical process."

In the 'Transactions of the Ethnological Society,' New Series, vol. i. part 2 (1861), p. 138, Captain Sir E. Belcher gives an account of the methods used by

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when there was no such abundance as now of the necessary instruments, and people who gained their livelihood by practising this occupation. But I conclude by saying it is an admirable thing to see them made, and no small argument for the capacity of men who found out such an invention.' Vetancurt ('Teatro Mejicano') gives an account, taken from the above. Hernandez ('Rerum Med. Nov. Hisp. Thes.' Rome, 1651) gives a similar account of the process. He compares the wooden instrument used to a cross-bow. It was evidently a T-shaped implement; and the workman held the cross-piece with his two hands against his breast, while the end of the straight stick rested on the stone. He furthermore gives a description of the making of the well-known 'maquahuitl,' or Aztec war-club, which was armed on both sides with a row of obsidian knives, or teeth, stuck into holes with a kind of gum. With this instrument, he says, a man could be cut in half at a blow—an absurd statement, which has been repeated by more modern writers."

the Western Esquimaux tribes, at and north of Icy Cape, in making their stone implements. He says:—

"Cape Lisburne is about sixty feet in height, composed of a greyish dolomite, in which many fossil encrinites, corals, and crustacea are found. Near the base, about four feet above the sea-level, a vein of chert is found, on which this friable stone lies. It varies from about nine inches inland (as exposed) to about three or four inches as it is lost in the gravelly beach. It is broken in vertical shivers, or conchoidal plates, by a slight tap with the hammer (formed of a very stubborn jade, or nephrite), the splinters affording a ringing sound like glass or pottery. The fragments, indeed, in many instances, were already sufficiently formed without human aid for the ordinary purposes of flaying, or skinning off the superfluous fat from hides, etc.; indeed it then occurred to me that many fragments, where nature seemed either to have pressed heavily, or acted by frost, were so splintered and almost formed by nature to be used as arrow- or spear-heads without further attention to chipping. But to the *process* which they pursue in effecting the fine regular serrated edges which you will notice in those specimens now before you.

"Possibly, had I not witnessed the operation, and been at the time one of the first Europeans with whom they ever held communion, the idea would have remained undisputed that 'they owed their formation to the stroke of the hammer.' Being a working amateur mechanic myself, and having practised in a very similar manner on glass with a penny-piece in 1815, I was not at all surprised at witnessing the *modus operandi*. Selecting a log of wood, in which a spoon-shaped cavity was cut, they placed the splinter to be worked over it, and by pressing gently along the margin vertically, first on one side, then the other, as one would set a saw, they splintered off alternate fragments until the object, thus properly outlined, presented the spear or arrow-head form, with two cutting serrated sides.

"But let us revert to this instrument, for the use of which the untaught would *never imagine a purpose*, and, I suspect, was not witnessed or deemed worthy of notice by any other individual of the expedition.

"First, this instrument (again ornamented) has a graceful outline. The handle is of fine fossil ivory. That would be too soft to deal with flint or chert in the manner required. But they discovered that the point of the deer-horn * is harder, and also more stubborn; therefore, in a slit, like lead in our pencils, they introduced a slip of this substance and secured it by a strong thong, put on *wet*, but which on drying becomes very rigid. Here we cannot fail to trace ingenuity, ability, and a view to ornament. It is the point of deer-horn which, refusing to yield, drives off the fine conchoidal splinters from the chert.

Fig. 13*b*. *Fig.* 13*a*.

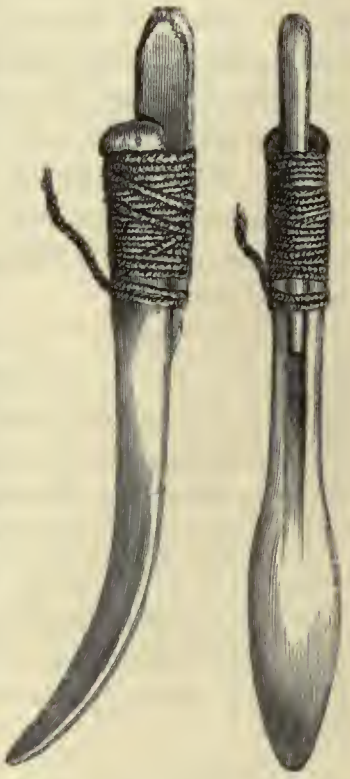


Fig. 13. Stone-chipper used by the Esquimaux (Christy Collection). Half nat. size.

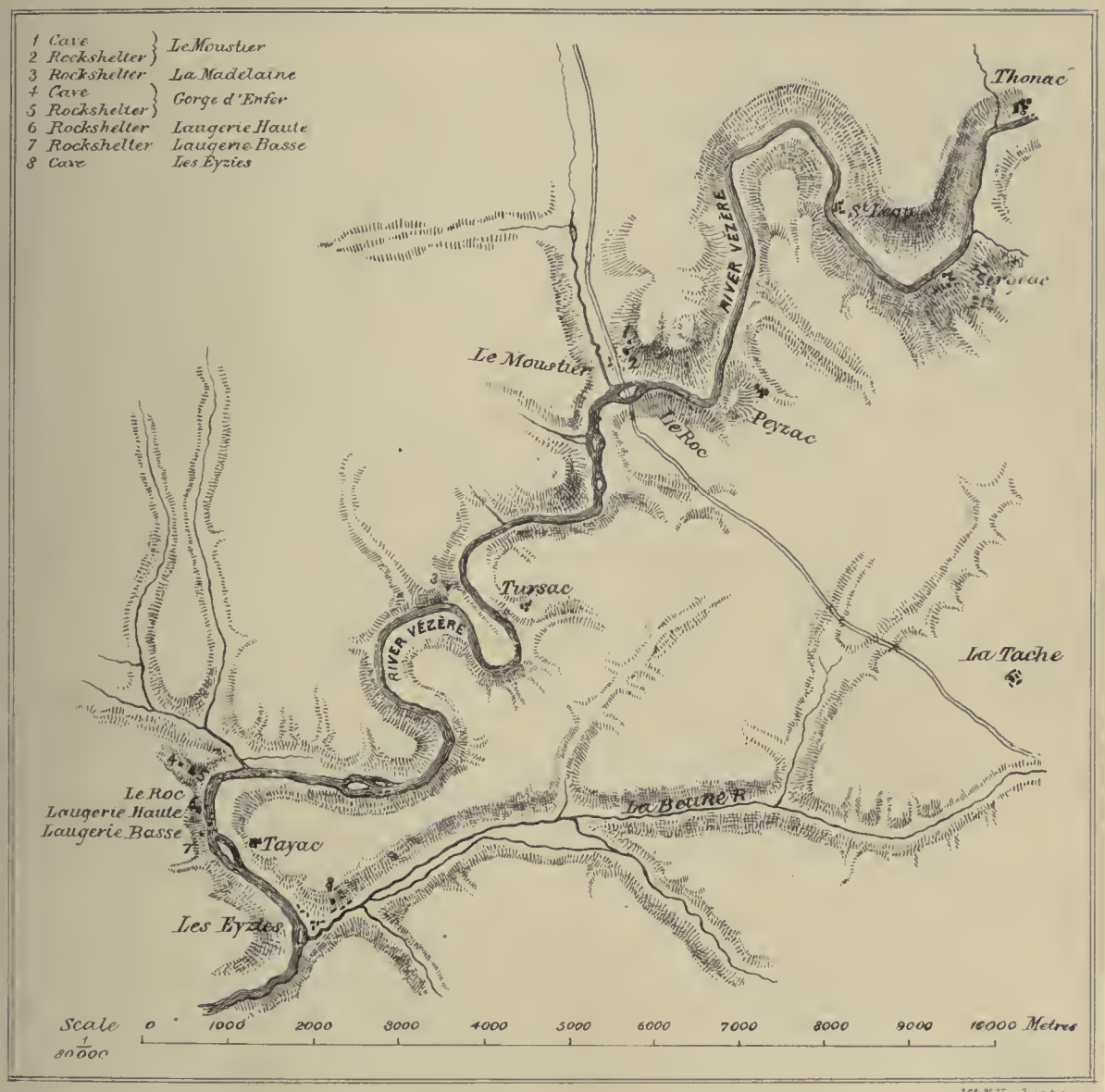
a, Seen from above.

b, Edge view.

"I cannot here omit remarking that the very same process is pursued by the Indians of Mexican origin in

"* Wherever horn is named, it refers to the hard point of the antler of the Reindeer."

SKETCH-MAP OF A PART OF THE VALLEY OF THE VÉZÈRE.



M & N Hanhart imp.

California with the obsidian points for their arrows. And also in the north and south Pacific, at Sandwich Islands, 21° north, and Tahiti, 18° south—39 degrees=2340 miles asunder—similar indentations or chippings are carried out in forming their axes from basaltic lava, but probably performed in the latter instances with stone hammers. I myself witnessed at the Convent of Monterey the captured Indians forming their arrow-heads out of obsidian exactly similar to the mode practised by the Esquimaux."

§ II. *Caves of Dordogne.*—The calcareous formations of Central and Southern France abound in caves; and their ossiferous deposits give evidence that, besides those introduced by the agency of water, they comprise also those which have accumulated when these caves were the haunts of wild beasts or the sheltering places of men. Some have been the resorts of beasts alone, and some only inhabited by man. In the comparatively few which have been tenanted by both, there are usually indications that the earlier occupancy has not been that of man. The osseous remains in the former class are usually entire, or, if broken, bear, in tooth-marks, indications that they were broken by Carnivora; on the other hand, in those inhabited by man, the bones, except those originally without marrow, are very generally in fragments. No part of France appears to be richer in caves which have been inhabited by man than the ancient province of Périgord, a portion of the old Roman Aquitaine.

It is especially in the Valley of the Vezère, a tributary of the Dordogne, which is an affluent of the Garonne, that these remains are in great abundance, and are indisputably contemporaneous with the remains of animals extinct in that country before history or tradition. In it, and in some of its lateral branches, have been found the resting-places of an early race, either in the small caves usually denominated *grottes*, or in the sheltered recesses of overhanging cliffs (*abris*), —the former sometimes at an elevation of one hundred feet above the river, as the cave at Les Eyzies; and the latter, as at La Madelaine, but little above the line of an extraordinary flood at the present day—from which it would seem that the river-level has not materially varied since the accumulation of these osseous remains.

On the other hand, in the Cave of Moustier, at an elevation of ninety feet above the river, and where the valley is of considerable width, the line of human occupation is covered, to the depth of five or six feet, by earth subsequently introduced, filling the cave to its very top. We leave to those more competent to reconcile these apparently conflicting facts, as well as to determine how much the formation of this picturesque valley is due to erosion, and how much to fissure,—subjects which were matters of warm debate with a party of geologists who lately traversed the principal portion of its course.

Contents of the Caves.—The deposits consist usually of accumulations of broken bones, various-sized pebbles of stone extraneous to the local formation and collected from the river-bed, nodules of flint from which flakes have been struck, innumerable fragments or chips detached in the first dressings of these cores, and countless thousands of blades of flint, varying in size from lance-heads long enough and stout enough to have been used against the largest animals, down to lancets no larger than the blade of a penknife, and piercing-instruments of the size of the smallest bodkin. These remains are usually intermixed with charcoal in dust and in small fragments, and extend to a depth in some cases of eight to ten feet, and a length of sixty to seventy feet.

Besides these have been found a multitude of implements formed of bone or deer-horn, and equally proved to have been made there, by the presence of the remnants of the bones and horns from which they had been sawn, and by the implements themselves being often in an unfinished state. They consist of square chisel-shaped implements; round, sharp-pointed, awl-like tools, some of which may also have served as the spikes of fish-hooks; harpoon-shaped lance-heads, plain or barbed; arrow-heads, with many and sometimes double barbs, cut with wonderful vigour; and, lastly, eyed needles of compact bone, finely pointed, polished, and drilled, with round eyes so small and regular that some of the most assured and acute believers in all other findings might well doubt whether indeed they could have been drilled with stone, until their actual repetition by the very stone implements found with them has dispelled their honest doubts. More than this, all but two of the many deposits explored have given more or less of examples of ornamented work; and three of them (Les Eyzies, Laugerie Basse, and La Madelaine) drawings and sculptures of various animals, perfectly recognizable as such.

The Old Fauna of the Country.—It is not so much the existence of the multitudinous implements in stone and bone, with the evidences of their manufacture on the spot, which invests these deposits with their chief interest; but the even yet more multitudinous examples of bones, broken up by man, of animals extinct in that part of Europe, out of all record of history or tradition, and the failure as yet to detect amongst them any undoubted indication of the early domesticated animals. The broad features of the fauna are the same throughout the district: the Reindeer is almost everywhere by far the most prevalent animal; in some places the Horse is next, in others the Aurochs; but in all the first two have been a staple food.

The Ibex and the Chamois, now only found on the higher peaks of the Alps and the Pyrenees, then dwelt on the neighbouring hills; the Wild Boar was scarce, or but little eaten. In fine, with the exception of the Horse, the fauna tends to a northern grouping, in which a species of Spermophile plays its tiny but significant part.

That these rock-dwellers fared not badly in other matters of food is proved by the many bones of Birds and of Salmon which are mixed with the refuse. Nor, as regards quantity, was there any great struggle for existence, as is shown by the many bones massed in the breccia (where the infiltration of water charged with lime or iron has massed the deposits into a more or less solid conglomerate), and which remain articulated, showing that some parts, such as the foot, for instance, were not closely eaten.

Works of Art of the Cave-dwellers.—With these evidences of easy living, it is not surprising to find there was leisure for less necessary work, and that spare time found occupation in works of pleasure, as instanced in the sketches and sculpture before alluded to. And it is curious to trace how they passed from the simple exercise of industry to ornament, and at last to something of art; for such may well be termed the sculptured poniard-handle, representing the figure of a Reindeer, and which, whilst clever in its adaptation of the material to the purpose intended, preserves at the same time all the characteristics of the animal. It is to be regretted that this example, so remarkable for its period, is but an unfinished essay,—unless it be here as it has been sometimes found in more modern times, that the genius of the artist was more conspicuous in the clay than in the marble, in the sketch than in the finished picture.

With these early cave-dwellers the art of painting was, as far as we know, limited to that favourite aboriginal colour, red. Various pieces of soft red hematite, covered with scratches, indicate how they scraped off a red powder, which, mixed with grease, would furnish as good means of personal adornment as is employed by many Indians at the present day. And that they were not insensible to the charms of sound as well as sight, may be inferred from their having made whistles out of phalangeal bones of the Reindeer or Chamois; these have been found in more than one Station.

Teeth of animals (the Reindeer, Horse, Aurochs, and some others), as well as Shells of several species, drilled, and in some cases cut ornamentally, have been found in several of the Stations, and no doubt have been worn either as ornaments or as amulets.

That these rude people had communication with the outer world, or were them-

selves migratory, is manifest by there having been found in four different places Rock-crystal, either wrought or unwrought, which does not occur in the neighbouring country, and by the finding at three of them fossil Shells which must have been brought from the Faluns of Touraine (a distance of at least one hundred miles), and all of which have been pierced for suspension.

Hearths and Cooking.—We have also some indications of the domestic economy of this early race in a variety of stones found in these accumulations.

There are some which have neither served for hearth- nor boiling-stones, but, from their fractured ends, have evidently been used as hammers; some which, from their being of too great a size for implements of manufacture, and the absence of fracture, may have been used for breaking bones to extract the marrow; others, from the artificial depression on either side, suitable for firm handling, and from the many fractures of concussion at the outer edge, have no doubt been employed in the manufacture of flint tools. Besides these are small flat slabs of schistose stone, —some bearing grooves made by cutting-implements, it may be for sharpening; and others which, from their smoothness, may have been used as polishers of bone implements; and, lastly, objects in considerable numbers and found in several places, the use of which it is difficult to conjecture, viz. water-rounded pebbles of various sizes, almost always of granite, the upper surface of which has been artificially hollowed out, leaving a flat saucer-like depression, the size of which varies from an inch to four or five inches in diameter.

The number of hearths, the great abundance of charcoal, and the presence of many more round quartzose pebbles (often bearing traces of fire) than would be requisite for the uses of the hearth or paving, for the fabrication of flint knives, or for smashing bones, as well as the very small proportion of bones which show the action of fire, all lead to the doubt whether the flesh taken from the large mass of fractured bones found at all the Stations, if it has indeed been cooked, has been cooked by roasting.

In favour of the food having been cooked, is the abundance of fires, more than in that rude condition of life could be supposed to be required merely for purposes of warmth. If the meat was cooked by roasting at the fire, it is not likely that so many of the bones would escape traces of fire.

The absence of any sufficient depth of earth between the layers of bones and the rock-floor in the Les Eyzies Cave, where, above all places, both the charcoal and the burnt pebbles are in the greatest abundance, forbids the idea that these cave-dwellers cooked in the manner so long practised by some tribes in North America, and still

used in our own country by the gipsies—namely, that of burying in the ground the animal encased in clay, and lighting a fire over it. The only other way, then, in which they can have cooked their food is by boiling; but the general absence of pottery in the Reindeer-caves of Périgord makes it difficult to imagine how they could effect this, unless we suppose they may have employed means still, or until lately, used by the Indians of North America, who boil their food without putting the vessel in which it is cooked upon the fire. Vessels of wood, of bark, or of plait so firmly worked as to contain water, are all spoken of by travellers within a century past as in use for boiling food by means of stones heated in the fire and then thrown into these vessels filled with water, which is thus boiled from within*.

Although there is, in this district of Périgord, throughout these deposits of the Reindeer-period, an almost entire absence of pottery, there are yet indications that in a later period of the Stone-age the knowledge of it was possessed by the inhabitants of this country; for at the distance of a few miles, on a plateau of considerable elevation near the Château of the Marquis de Campagne, abundant fragments of rude pottery have been lately observed, in connexion with a carefully chipped barbed arrow-head of so called Celtic type, and a portion of a polished stone axe.

Former Climate.—In addition to the presumption of a once colder climate which is furnished by the fauna, it is difficult to suppose that at the period when these remains were left the climate was the same as it now is; for, though we may have examples in the habits of the present Esquimaux, that in their cold climate it is possible to live without detriment to health amid an accumulation of animal remains, the case would be very different in the South of France, where at the temperature of the present day such accumulations would, except in winter, become speedily a fearfully decomposing mass. That the inhabitants of that day had no such difficulty to contend with may be inferred from their having almost invariably chosen a southern exposure and the warmest and sunniest nooks for their residences; and that they lived in them at all seasons, and did not quit them in summer for cooler ones, is evident from the occurrence of the Reindeer horns and bones in all conditions of age.

It is to be noted that in this country there are no high mountains, among whose snows, as in the Pyrenees, the Reindeer could have taken refuge from the summer heats,—the greatest elevation being a little over eight hundred feet.

* The European bushranger in Australia practises a similar method of heating water, in a hollowed lump of the soft Bottle-tree. See also the Chapter on "Fire-making and Cooking," in E. B. Tylor's 'Early History of Mankind,' 1865.—Edit.

§ III. *The Reindeer-Period.*—It is of some interest to have good proofs, on a large scale, of Man's coexistence with the Reindeer in Southern Europe—still more to trace his hand in the fracture of its bones for food, and the marks on them of his knife as he cut away its skin, its flesh, and its sinews for thread,—but of greater interest still to find upon its horns, engraved, cut in relievo, or sculptured, representations of the animal itself, rendered with a fidelity which makes them characteristic and unmistakeable.

It would be easy to cite many circumstances illustrative of the resemblance between the condition and habits of the modern Esquimaux and these cave-dwellers of France at the Reindeer-period. But now comes the great question, When was the Reindeer-period in Southern France? and what is its antiquity?

It is far easier to indicate its place in the series of observed facts in relation to ancient man, than to assign to it any definite antiquity of years. Geologically, a wide gulf separates it from the Drift-period, though perhaps wider in the geological than in the palæontological aspect; but, on the other hand, it will seem, both from the palæontological and archæological bearings, to be of higher antiquity than the Kjökkenmöddings of Denmark and the Lacustrine Dwellings of Switzerland, and very certainly than the whole group of so called Celtic and Cromlech remains. Comparing its fauna with that of these various periods, the Reindeer-period may be placed thus:—

In the Drift (Valley-gravels) the Mammoth, Rhinoceros, Horse, and Ox are the predominant animals, and the Reindeer appears but sparingly. In the Dordogne Caves the Reindeer predominates, associated largely with the Horse and Aurochs, and exceptionally with some remains of Mammoth, Hyena, &c.; but all traces of such domesticated animals as the Sheep, the Goat, and the Dog are wanting.

In the Kjökkenmöddings of Denmark, though so much nearer the Subarctic regions, the Reindeer is not found, and the fauna, though more ancient than that now existing, indicates the presence of domesticated animals (Dog).

The same may be said of the Swiss Lacustrine Dwellings: domestic animals are present; and the Reindeer is absent even from the most ancient of them, though that it was once in the neighbourhood is manifest by the existence of its remains in caves (at l'Echelle) in the same district.

In none of the Cromlechs or Sepulchres is there a trace of Reindeer; and the fauna indicated by the remains found in them is cited as more recent than either the fauna of the Kjökkenmöddings or that of the most ancient of the Lake-dwellings.

From the archæological or industrial point of view, it may be remarked that from the Drift we have no example of Man's industry except implements of flint; and of these only the larger and coarser have been detected, though there is no reason to doubt that he had also implements for finer work than the majority of those found are fitted for.

In the Reindeer-period, although Man had attained to a great proficiency in chipping, we have a total absence of ground or polished axes; and though he had arrived at the art of sewing, there is no trace of his having known how to spin; and in many of these caves of Dordogne there are no traces of pottery.

In the Kjökkenmöddings pottery is not unfrequent, though ground axes are very few, but not wholly wanting*, and spindle-whorls are scarce.

In the very oldest of the Lake-dwellings (those in which there is no trace of metal, as at Wangen) the majority of the axes are ground, and the grinding-beds are the same as those found in the Surface-period of Denmark and England. Pottery is abundant; not only spinning but weaving is presented; and there are evidences that the cultivation of wheat and other cereals had been attained to. In the Cromlechs and the Sepulchres, pottery is abundant; and the frequent occurrence of articles in bronze indicates a later time.

In conclusion, it must be admitted that the facts here stated bear on the hitherto presumed duration of Man's existence on earth, and can only be fairly interpreted in favour of a higher antiquity than was once assigned to it, and that these and kindred researches are doing in degree for the chronology of Man what geology has already done for the chronology of the earth's crust; but, at the same time, we are bound to confess that, so far, nothing in the investigation of the works of uncivilized or primitive man, either of ancient or modern times, appears to necessitate a change in the old cherished idea of the Unity of the Human Race.

H. C.

* Mr. John Evans, F.R.S., F.S.A., in company with Professor Steenstrup, For. Mem. R.S., recently discovered in one of the Danish Kjökkenmöddings two or three flint flakes made out of broken polished axes; he also found a polished gouge-edged hatchet, ploughed up on the surface of another Kjökkenmödding. Professor Steenstrup has also detected specimens similar to those first-mentioned among the numerous flint implements found along the sea-margin of Denmark and referred to the period of the Kjökkenmöddings.—Editor, February 1867.

III.

SKETCH OF THE CHIEF GEOLOGICAL FEATURES OF THE VALLEY OF THE VEZÈRE AND THE BORDERING COUNTRY*.

THE Caves and Rock-shelters containing the Aquitanian relics treated of in this Work are, as already described (pages 3 and 20), excavated in cliffs of limestone along the lower portion of the Vezère. A considerable extent of country traversed by this part of the river, in a N.E.–S.W. direction, from near Condat† to Limeuil, where the Vezère joins the Dordogne, and by the latter river to La Linde, and seven miles beyond, is composed of stratified limestones, thinly capped, here and there, by patches of clays, sands, ironstone, and gravel (see Map, p. 29). The limestones have a gentle inclination to the south-west (see Section, p. 29); their lower beds successively disappear as we go down the river, under the outcropping edges of the upper layers. Right and left of the Vezère these calcareous strata stretch far away, with a N.W.–S.E. 'strike,' through the Departments de la Dordogne and du Lot on the one hand, and through the Departments de la Dordogne, de la Charente, de la Charente Inférieure, &c., on the other (see Map, p. 29).

These limestones (*k* in the Map and Section) mostly belong to the Cretaceous‡ System,—that is, all those forming the thirty miles of country from below La Linde, along the Dordogne and the Vezère, to about three miles north-east of Montignac (near Aubas). There Jurassic limestones and Infra-lias (*i*, *h*, *f*) form the ground for about three miles; and above this the Vezère has its course through

* The Geology of the Department de la Dordogne has been treated of:—in MM. Dufrénoy and Élie de Beaumont's 'Explication de la Carte Géologique de la France;' in M. le Vicomte d'Archiac's 'Histoire des Progrès de la Géologie,' &c., in which are given references to previous writings on the subject; and in several memoirs by Coquand, d'Archiac, Hébert, Arnaud, Harlé, and others, in the 'Bulletin de la Société Géologique de France.' A notice of the Dordogne Chalk and Fossils also occurs in M. d'Archiac's 'Géologie et Paléontologie' (8vo, Paris, 1866), p. 605, &c. The accompanying sketch-map has been taken from Dufrénoy and Élie de Beaumont's Geological Map of France.

† The Orleans Railway passes near Condat; and from the Railway-station there, under the guidance of the late Henry Christy, many of his friends have started, after examining the Badegoule Cave, on pleasant trips down the Vezère, by taking boat on its little tributary the Ser ("Cerne" in some maps), near Condat.

‡ M. d'Archiac says that the zone of Cretaceous strata on the south-west of the Central Plateau extends from Souillac and Cahors (Dép. du Lot) to the Island of Oléron, with a length of 70 leagues and a breadth of 15 leagues.

sandstones belonging to the Trias (*e*), and exposes the underlying patches of Carboniferous strata (Coal &c., *d*) in its valley at Cublac and near Alassac*.

The upper course of the Vezère is among the mica-schists, gneiss, granite, and porphyries, or the metamorphic and igneous rocks (*c*, *b*, *a*), of the Central Plateau. Hence the gravel along the river-course is composed of more or less rounded fragments of quartzite and vein-quartz, and of micaceous, hornblendic, granitic, and other rocks, derived from the uplands, mingled with the limestone and flint of the lower district. Similar materials constitute the patches of the neighbouring old Alluvia, formed at various times, when the river had greater breadth and a higher level.

The Granitic and Gneissic Rocks (*a*, *b*, *c*).—The rocks constituting the higher region, or Central Plateau, are chiefly "metamorphic," such as gneiss, marble, slate, mica-schist, and other varieties of crystalline rocks, that have resulted from the metamorphosis, or alteration by pressure, chemical agencies, or direct fusion, of old sandstones, shales, limestones, &c., whether of Laurentian, Cambrian, Silurian, or later age, into new forms of mineral matter, but often preserving clear traces of their original bedding. Igneous rocks, such as greenstones, porphyries, granites, &c., also occur as dykes and bosses protruding through these old schists; and mineral veins, or cracks filled with infiltrated quartz, metallic ores, and other minerals, are of frequent occurrence.

The Carboniferous Rocks (*d*).—The Coal-measures consist of reddish schists, sandstones, and conglomerates,—yellowish-grey sandstones,—and dark-coloured micaceous shales with plant-remains (Ferns, &c.) and a few thin seams of coal; and they form isolated patches or remnants of a once broad sheet of Carboniferous strata†. Resting against the old schists, they lie at high angles, and are contorted, dislocated, and traversed by porphyries. The red sandstones of the Trias have been deposited on their upturned and denuded edges.

The Triassic Rocks (*e*).—From near Alassac to L'Arche, and thence, past Terrasson, to Le Lardin, the Vezère traverses red and variegated sandstones, referred to the Triassic System, overlying unconformably some Carboniferous strata, and capped here and there with patches of Infra-lias and Oolite. About

* For a pictorial section of the hills of granite, gneiss, slate, coal-measures, and red sandstone, at Le Saillant, near Alassac, see Dufrénoy and Élie de Beaumont's 'Explication de la Carte Géol. de la France,' vol. i. p. 126.

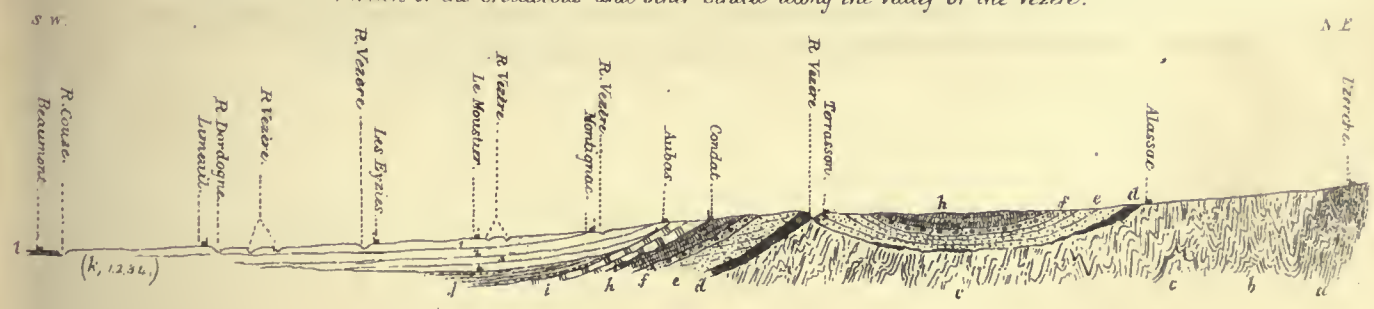
† The sections of these beds at Alassac, Brives, Le Lardin, and Cublac are given in the 'Explic. Carte Géol. de la France,' vol. i. pp. 126, 619, and 629.

GEOLOGICAL SKETCH-MAP OF THE VALLEY OF THE VEZÈRE & NEIGHBOURING COUNTRY.

Tertiary.
Cretaceous.
Upper Oolite
Middle Oolite
Lower Oolite
Lias.
Infral.
Trias.
Coal.
Micaceous Schist.
Gneissic Schist.
Gneiss
Roads.
Railways.
Line of Section

De Wilde lith. M & N Hanhart imp.

Section of the Cretaceous and other Strata along the Valley of the Vezère.



Terrasson the red beds consist of conglomerate and pebbly sandstones, formed of pebbles and grains of quartz (mostly milk-white, but occasionally hyaline), with a reddish cement of ferruginous clay; the sandstones also contain decomposed felspar, and are often micaceous and fissile: their angle of dip is sometimes as much as 40°. They are classed as the *Grès bigarré* or Bunter Sandstone—the lowest member of the Trias.

In their upper portion occurs some limestone, supposed to be equivalent to the Muschelkalk. In some places this appears as concretionary nodules, with traces of Corals; elsewhere it expands into great stratified lenticular masses.

Still higher beds are red and green variegated sandstones, laminated and false-bedded, quartzose and micaceous, with a white argillaceous cement. These are regarded as the *Marnes irisées*, or Keuper Sandstone, the uppermost division of the Trias.

The Infra-lias (*f*), *the Lias* (*g*), *and the Oolite* (*h*, *i*, *j*).—Still further westward, and lying (for the most part unconformably) on the above-mentioned inclined Triassic beds, are thin grey quartzose sandstones (Infra-lias, or Grès de Lias) and some magnesian limestones, characterized by *Gryphæa* and *Belemnites*, referable to the Lias*. Further to the north the Infra-liassic beds lie on the old crystalline rocks, with the interposition of beds of arkose†. At some places they comprise gypsiferous clays, and their sandstones and breccias are full of barytes, oxides of manganese and iron, and other minerals.

The Oolite follows to the south-west, and is represented by (1st, *h*) thin bands of crystalline limestone (often dolomitic, and either friable or hard and cellular),—succeeded by (2nd, *i*) yellow limestones, more or less oolitic, and compact white oolitic limestones (*Oolithes miliaires*), in which large lenticular Coral-beds are recognized; and lastly, in some places, the series is completed by (3rd, *j*) shales and thin limestones, characterized by *Exogyra virgula*.

One of the hills near Condat, about a mile to the north-west of the Railway-station, and on the slope of which (at about 260 feet above the valley) the Badegoule Cave is excavated, consists of yellowish limestone belonging to the Oolitic series. One band of shells, from the upper part of the hill, is composed of numerous donaciform Bivalves, very much like M. Buvignier's *Hettangia Broliensis*‡ from the upper sandy limestone of the Lias of Breux.

* The Lias is more fully developed to the South-east.

† Granitic materials disintegrated and rearranged.

‡ 'Statistique géologique &c. du Département de la Meuse,' par Amand Buvignier, 1852, p. 14, pl. 10. figs. 22–25. The genus *Hettangia* (or *Tancredia*) belongs to the Lias and the Lower Oolite.

Sandy alluvium, irregularly bedded here and there, lies on the side of the hill, up to and beyond the cave, and contains numerous large pebbles of quartz, quartzite, and schist; but there is little or no alluvium on the upper part of the hill, where the limestone is nearly bare, and only a few scattered pebbles occur. Some weathered blocks of iron-ore (brown hematite) lie on the hill-top, probably the débris of some Tertiary beds (such as *l* of the Map and Section).

A specimen of thin-bedded, yellow, marly, fossiliferous limestone, also from some part of the above-mentioned hill near Condat, bears on the planes of bedding numerous small Bivalves resembling Buvignier's *Lucina Mosensis** from the Upper Coral-rag of Saint-Germain. A larger Bivalve and some small Oysters occur in the same block of stone.

The Cretaceous Rocks (*k*).—A hard, pinkish-white, compact limestone, oolitic (or rather pseud-oolitic) in structure, containing remains of Corals, Polyzoans, *Rhynchonella*, &c., is quarried south of the Condat Railway-station on the right-hand (west) bank of the river, for road-metal and other purposes; and one band at least of this limestone yields a small Echinoderm, probably identical with *Nucleolites oblongus*, Desor, which is found in the 'Senonian' stage of the Chalk (Upper) in the North of France. This limestone seems to be one of the lowest in the Cretaceous series at this place, and to be succeeded upwards by the limestones that are met with nearer Montignac, which, in their turn, are covered to the south-west by higher strata. The limestones being all whitish and nearly horizontal, the cliffs of the river-bluffs seem at first sight to be formed of the same great strata; but descending the Vezère we come to newer and newer beds.

Near Montignac we find *Rudistes* in the talus of the cliffs; and a coarse, friable sandstone, like the Quadersandstein of Germany, caps the cliff not far from the same place. A thick Polyzoan limestone has also set in near Montignac (reminding us of the similar rock of Touraine, Maestricht, and Faxoe), and continues, by Moustier, to Les Eyzies. *Ostræa vesicularis*, *O. carinata*, *Rhynchonella alata*, and *Trigonia* are found in the cliffs between Le Moustier and Les Eyzies.

As to the Flint of the district, the railway-cuttings between Périgueux and Thenon show abundance of flint-nodules in the Cretaceous limestone; flint also abounds in the limestone near Montignac; and probably these are the same flint-bearing beds, as the general strike, or bearing, of the strata passes through the two localities.

The Cretaceous system is represented in the Department of the Dordogne by

* 'Stat. géologique &c. de la Meuse,' p. 12, pl. 10. figs. 9–11.

successive limestones sloping away gently to the south-west (Section, p. 29, *k*, 1, 2, 3, 4), nowhere occurring all in one vertical section, and altogether probably not having an aggregate thickness of much more than 200 mètres. The lowest of these four groups into which M. le Vicomte d'Archiac has divided the Cretaceous strata of this Department seems to be wanting in the district traversed by the Vezère, the series having there commenced with the beds characterized by *Exogyra columba*—the lower part of M. d'Archiac's Third Division. Of the Third Group the uppermost beds are seen (under other limestones) to form the banks of the Vezère at and near Montignac; and they come out to the surface of the country somewhat further up the stream. Limestones of the next highest stage form the high ground near Montignac, and range beyond Périgueux on the north, and to Sarlat and Gourdon on the south.

The nearly flat uppermost limestones (*Premier Étage* of D'Archiac) form a considerable extent of ground traversed by the Rivers Vezère and Dordogne, on their way westward by Limeuil and La Linde towards Bergerac, halfway between which last two places the Cretaceous strata disappear beneath Tertiary beds (*l*) of limestone (of freshwater origin), sands, clays, and ironstone.

The Cretaceous limestones of the Department of the Dordogne are remarkable for the large rough Bivalve shells belonging to the family *Rudistes*, particular forms of which abound at four or five different levels in the series. The limestones are often oolitic (or rather pseud-oolitic) in structure; that is, they consist of roundish fragments of Shells and Polyzoans cemented with carbonate of lime (occasionally crystallized). Sometimes the particles are but slightly cemented, and the rock is friable. Occasionally the fragments of Polyzoa have not been much triturated; and in some cases they are merely broken stems lying matted together. Similar varieties of Polyzoan limestone occur in the Chalk of Touraine, Maestricht, and Denmark.

The Flint in the Chalk of the Dep. de la Dordogne is mostly only so much of the Cretaceous stratum silicified,—the particles of *Polyzoa*, the *Orbitoides*, and other organic remains being still in place and retaining their characteristic structures. Even Fish-teeth (*Otodus*), in a block of Flint from near Le Moustier, have been altered into Flint, excepting a thin external pellicle. There is also Flint showing a further progress of mineralization, in which the constituent organic remains of the limestone have been more and more removed from sight by the increased homogeneity of the pseudomorphous silex, as is usually the case with the flint of Northern France and of England.

The Dordogne limestones are thrown into undulations, and traversed by cracks

and dislocations, as is usual with such rocky strata. One of these "faults" in particular is conspicuous in the precipitous hill-side bordering the valley of the Vezère, between Le Moustier and La Madelaine.

We must refer the reader to the books and memoirs of MM. d'Archiac, Hébert, Coquand, Arnaud, Harlé, and other eminent geologists of France, for detailed descriptions of these Cretaceous Limestones, which, deeply channelled by the Vezère for nearly thirty miles, and cut into by its many tributary valleys, are on nearly all their precipitous escarpments excavated by natural agencies and the hand of Man into galleries, recesses, and caverns, which here and there have been elaborated into residences with stairs and chambers. A general idea, however, of their characters and structure, useful to the passing observer, and sufficient for our descriptions of the Caves, their nature and their position, is offered in the following condensed description of M. d'Archiac's several Stages of the Cretaceous System as it exists in the district under notice.

Premier Étage.—The uppermost group of the Cretaceous Limestones, coming out from under the Tertiary beds on the Dordogne, and on the Couze at Beaumont and elsewhere, and spreading over the country to the north-west, east, and south-east, are described by D'Archiac as being yellowish, sometimes soft and friable, sometimes hard but full of small cavities, especially towards the upper part, where the stratification is often indistinct, whilst the lower portion is more clearly bedded. Here and there the limestone is sandy with grains of quartz and glauconite, and sometimes micaceous.

These yellow limestones ("*le Premier Étage*" or "*les Calcaires jaunes supérieurs*" of M. d'Archiac) contain, among other fossils, *Ostrea vesicularis*, with *Sphærulites cylindraceus*, and many other *Rudistes*. These are large rough shells, peculiar to the Cretaceous rocks, often large, subcylindrical, rough externally, coarsely cellular in structure, and known, according to the different genera, under the names of *Hippurites*, *Sphærulites*, *Radiolites*, *Caprina*, &c. There are several zones or beds of Rudistes in the Cretaceous series of the Dordogne, characterized by different species; and the "Premier Étage," containing two beds of them, is M. d'Archiac's "Upper Zone of Rudistes."

The road-section on the hill of Beaumont, south of La Linde, showed, besides the overlying Tertiary beds of limestone (of freshwater origin), sands, clays, and ironstone (altogether about 30 mètres thick), a succession of Cretaceous strata, 80 mètres thick, in the following order (from above downwards):—

1. Coarse-grained, friable, yellowish-grey limestone, with quartz grains in it. Containing some *Rudistes* (*Sphærulites*, *Radiolites*, and *Hippurites*). 6 mètres thick.
2. Whitish cellular limestone, harder than the bed above. With numerous *Rudistes* (*Sphærulites* and *Radiolites*). 10 mètres.
3. Hard limestone, passing into a yellow, compact but cellular and breccioid limestone. *Cyclolites* &c. 15 mètres.
4. Yellow limestone, hard, subcrystalline, and fissile. 4 mètres.
5. Yellowish-white limestone, hard and subcompact, alternating with subcrystalline limestone. 30 mètres.
6. Yellow homogeneous limestone, with earthy fracture, in regular beds. (This is the zone worked for the best building-stone in the line of quarries opened on both banks of the Couze and the Dordogne.) Towards its base this rock becomes breccioid, hard, and yellowish-grey, with sparkling fracture. 15 mètres.

The outcropping edges of these Upper Limestones follow an irregular line crossing the lower part of the Vezère. They have been very much denuded, and in some places have been cut away by the valleys so as to expose the next underlying set of beds. In the gorges of the Cretaceous Limestone near Campagne, north-west of St.-Cyprien, even the Jurassic series, characterized by *Exogyra virgula*, is exposed.

Deuxième Étage.—The next lowest Cretaceous zone consists of grey or whitish, marly, chalk-like limestone, in some places full of nodules of Flint. This band also traverses the Departments du Lot, de la Dordogne, and of the two Charentes, passing southwards under the yellow limestones, and on the north and east resting on an underlying white limestone. Towards its base the marly chalk, or chalk-marl, is sandy, glauconitic, hard, and laminated; but upwards it becomes thick-bedded, sandy, glauconitic, and micaceous, with grey and black flint-nodules distributed unequally throughout; and in its uppermost part this chalk is still more marly, friable, and soft, with fewer green glauconitic grains. Some of the most characteristic of the fossils of this "grey chalk" are *Ostrea proboscidea* and *O. auricularis*. The lower beds are especially rich in fossils, comprising numerous *Polyzoa*, *Ammonites* and other Shells, Echinoderms, claws of a Hermitcrab, Fish-teeth, &c.

This marly stratified limestone forms the banks of the Vezère at Montignac*, where it is characterized by *Terebratula alata*, *Lima Santonensis*, and *Pecten quadricostatus*, and contains also, besides other fossils, *Hippurites organizans*, *Sphærulites Sauvagesii*, &c. The general dip of the beds here is, according to M. Harlé, not more than 2·2 in 100 to the W. 25° S.

Beyond the neighbourhood of Montignac to the north-west, this second zone is more outspread, particularly on the Manoir and the Isle Rivers; and it is thicker and better stratified, yielding a good building-stone, on the Isle, where the beds are 90 mètres thick; and at Périgueux they are over 120 mètres, with black flint in abundance.

Troisième Étage.—The third group of limestones, forming the uppermost member of the Lower Cretaceous Formation, consists of:—1st (uppermost). Whitish limestones (white to the east, but yellowish westward), sometimes compact and subcrystalline†, sometimes soft and very friable, and nearly always abounding with Rudistes (*Radiolites lumbricalis*, *R. angulosus*, *R. cornu-pastoris*, *Sphærulites Ponsianus*, and *Sph. Beaumontii*), and constituting M. d'Archiac's "Middle Rudistes-zone." 2nd. White, greyish, and yellowish marly limestones. 3rd. Yellowish marly limestones, sandy and glauconitic, containing *Ammonites Fleuriausianus* &c., and blue clays with many Oyster-like Shells (such as *Ostrea biauriculata* and *Exogyra columba*).

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* The overlying limestone at Montignac (referred to also at page 32) is regarded by M. Harlé as being really a portion of the "Second Stage," and not an eastward extension of the "First Stage," reaching to Sarlat, as M. d'Archiac described it. M. Harlé traces it from Gourdon, &c., as a yellowish and glauconitic limestone, more thickly developed around Sarlat than it is even at Périgueux, where it is micaceous. It is composed of fragments of Shells and Polyzoans, with a yellowish calcareous cement. It usually resembles in colour and general appearance the "Upper Yellow Limestones;" but it really lies under the friable chalk-marl and upon the very persistent grey marly strata (at about 70 mètres above the level of the valley at Montignac); and all these together constitute the base of M. d'Archiac's '*Deuxième Étage*,' and of the Upper Cretaceous Formation. (Harlé, 'Bullet. Soc. Géol. France,' Deux. Sér. vol. xix. pp. 120 &c.)

† Locally termed "Chaudron." It is characterized by *Sphærulites radiosus*, *Sph. Sauvagesii*, *Hippurites organizans*, and *H. cornu-vaccinum*.

Quatrième Étage.—The fourth group of Cretaceous Limestones seems to be absent in the course of the Vezère; but its uppermost Beds (No. 1 of the following list) appear between the Périgueux and Thiviers Road and Millac-de-Nontron, lying between the limestones of the "Third Stage" and the "Upper Oolite;" and they probably extend to the S.E. They have been well seen around Marcuil. To complete our account of the Cretaceous series of the Dordogne we briefly note that this "Fourth Stage" consists of:—

1. Limestones, varying from white to yellow, from friable to compact, and sometimes sandy and glauconitic, and often abounding with *Alveolinæ, Caprinæ, Radiolites,* Echinoderms, and other fossils. M. d'Archiac's "Lower Rudistes-zone."
2. Grey, green, and ferruginous sands and sandstones, more or less calciferous.
3. Yellow or greyish, marly, cellular limestone, and calciferous concretionary sandstones. The limestone contains *Alveolinæ, Orbitoides,* Corals, Rudistes, Echinoderms, and other fossils.
4. Greyish pyritous clays, with lignite. (These sometimes alternate with the beds No. 3.)

The Caves.—The ossiferous caves and recesses (whether or not, in some cases, enlarged artificially) have been hollowed out, as already noticed, by atmospheric agency,—where the softer alternate with the harder bands of limestones, the latter often still forming more or less continuous ledges. The effect of the last winter's frosts in flaking off the concave faces of the softer beds is often conspicuous along these cliffs.

In the Cave of Le Moustier* there is much red, sandy, micaceous alluvium, very similar to the brick-earth of the valley below. It is not necessary, however, to suppose that the cave was on a level with the flood-waters of the valley since Man inhabited it; for, as Mr. J. Evans has suggested†, the sand may either have been blown in by the winds, or, possibly, it may have reached the cave from the top of the hill during the formation of a talus, removed for the most part since that time by the river having swept the foot of the cliff, from which it has now receded.

The little valley in which the Cave called Gorge d'Enfer occurs shows (as Mr. Evans pointed out‡) how the talus of the cliffs themselves may have choked the caves, thus accounting for some of the recesses being filled up to the roof. On one side of this valley the edges of the limestone strata are covered with a grass-grown talus; on the other the cliff is prominent, bare, and cavernous (see Woodcut, fig. 2, page 4). The alluvial bottom of the valley being cultivated as a "water-meadow," the old stream has been diverted to a small channel immediately under the bare prominent cliff, and made to distribute itself thence in rectangular rills at intervals over the soil. Whatever amount of talus may have accumulated on what is now the bare side, the above-mentioned process of cultivation has probably succeeded in removing, down to a line of ledges and recesses level with

* See Woodcut, fig. 1, page 3; and Lithographic Sketch, No. 1.

† In a Paper read before the Geological Society, June 22, 1864.

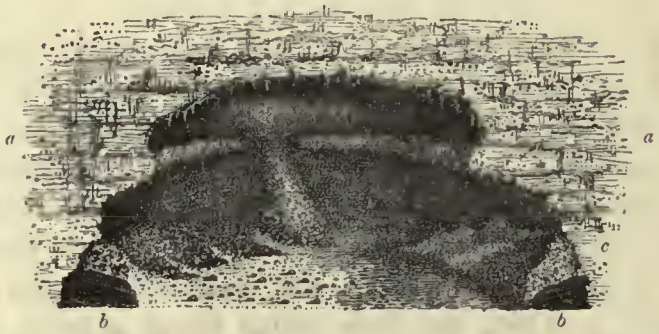
‡ In the same Memoir.

the present meadow. One of these recesses (rich with bones and implements), along the mouth of which the meadow-bank and the artificial stream pass by, was nearly choked with débris, fallen in, probably, from the back of the old talus since the cave was deserted,—the fallen rubbish of the cliff-face having been partly pushed backwards, perhaps, when alternately muddy and frozen (J. Evans).

In some cases flakings and fragments from the limestone roof seem to have formed a breccia over the ossiferous deposits, at least near the sides of the cave. Thus at Les Eyzies* the chief cave has a vaulted ceiling, ribbed with stalagmite, and corniced with a rough edge of a hard band of limestone (see fig. 14): the cornice is wanting at one place; and here the stalagmite has come lower down the wall and cemented more breccia than elsewhere in the cave, showing that at this place the fragments from the ceiling once formed a considerable mass against the walls and above the ossiferous layers.

T. R. J.

Fig. 14.



a, Limestone.
b, Hearth-stuff, with Bones, Flint Flakes, and Implements of Stone and Bone.
c, Breccia of Limestone, cemented with Stalagmite.

Diagram of the Cave-deposits at Les Eyzies.

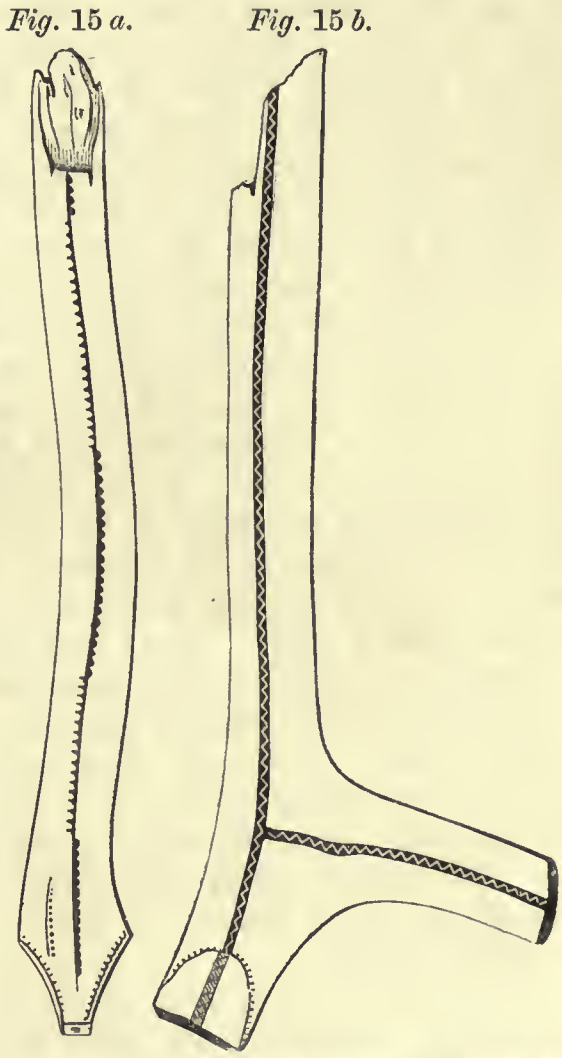
* See Lithographic Sketch, No. 2.

IV.

REMARKS ON THE SIMILARITY OF SOME IMPLEMENTS FOUND IN THE CAVES OF DORDOGNE TO SOME USED BY THE NORTH-AMERICAN INDIANS, ON THE "GERMANI" OF THE ROMAN PERIOD, AND ON THE RANGE OF THE REINDEER.

The following valuable Letter from a Correspondent*, who most kindly and readily replied to some inquiries respecting the probable use of the North-American horn tool (see fig. 15) referred to in the footnote at p. 32, the primitive weapons and habits of the Indians, and other associated subjects, cannot fail of being of high interest to our Readers, and raises the hope that others also will help us, by careful examination and mutual criticism, to arrive at as full explanations of the uses of the prehistoric implements that we have to treat of, and of the character and habits of the old people of Périgord, as circumstances will permit.

Since the Implement under consideration was noticed, in March 1866, as forming part of a collection sent from Vancouver and British Columbia to the Exhibition of 1862, a manuscript list of Indian articles, dated November 29, 1862, has been found,



Implement of Horn, from Mackenzie River, the great district traversed by the Mackenzie, North-east of British Columbia. (One-third of the natural size.)

* To another friendly correspondent (Mr. Robert Brown) we are indebted for another letter full of information, which we shall also publish.

in which it is referred to as a "Pick or Axe of Stag's Horn, from Mackenzie River."—T. R. J.

Rosebank, Victoria, Vancouver's Island, July 16, 1866.

SIR,—I received a few days ago your favour of the 22nd May, and have much pleasure in giving you any information that may tend to elucidate the very interesting subject which you have in hand.

As regards the "British-Columbian" Horn[1] [see the Appendix to this Letter for the Notes indicated by the Numbers 1-14] sketched by you in the margin of your letter [this is the specimen alluded to above], I think I can at once, and without hesitation, indicate the use for which it was originally intended. It is a chisel, used for various purposes among the Indians of the North-west Coast, but chiefly for raising the large sheets of bark of the *Thuja occidentalis* during the flow of the sap in summer, and for the excavation of the canoes formed of the wood of the same tree. Fire is first employed to char the surface, which is then easily abraded by means of the bone (or horn) chisel. A repetition of the process, again and again, completes the excavation of the canoe roughly; the finishing strokes are given with an adze or, rather, chisel, handled at an acute angle, and formed originally of stone, but now usually of a piece of iron or steel [fig. 22]. This implement, I may mention, appears to be the exact counterpart of one of corresponding use figured on Egyptian monuments, and is fastened to the handle with leathern thongs in the same way. I allude here to the implement last described, not to the horn chisel sketched by you, which is used alone, by pressure, or by occasionally striking it gently with a mallet. It was probably thus that the upper end of the horn in question was fractured. The ornamental lines I believe to have been engraved merely for the amusement of idle hours, and to have no assignable meaning beyond a taste for ornament. Such engravings, or others resembling them, are very common among the Indians of this Coast, originating from taste partly, and partly as marks distinctive of private property in various articles of domestic use. The short projecting piece of the brow-antler that appears in your sketch is designedly left to afford a firm hold to the lower hand while exerting pressure for cutting-purposes.

I have examined with much interest the engravings [a set of the Plates B. of the first two numbers of this Work] enclosed by you, representing some of the antiquities discovered in Dordogne. The appearance of these, or their counterparts, is very familiar; and I think I can assign an application for most of

them. To commence with that marked "B. Plate I." All the smaller articles in this sheet I believe to have been arrow-heads formed (I presume) of bone, and barbed. [See descriptions in detail at pages 10–12.] The lower part is tapered off so as to fit upon the wooden shaft of the arrow,—*babiche*, or sinew in a wet state, being employed to secure the junction, which, by its contractile powers in drying, it would do very firmly. (By *babiche*, I should explain, I mean thin cords of deer-parchment, such as are used by the North-American Indians for similar purposes and for lacing snow-shoes,—by *sinew*, the dorsal sinew of the Deer.) The figure marked fig. 8, in particular, is very familiar to me. As may be supposed, these primitive implements, as well as the arrow-heads of stone, &c., are gradually becoming rarer with the spread of the white population, and the introduction of firearms and more efficient implements of iron and steel. Indeed it would perhaps be difficult now to find specimens in actual use. Still, among the more secluded tribes, the use is not forgotten nor neglected, and especially by the old men—who, many of them, pertinaciously adhere to the customs of their forefathers, notwithstanding the changes that take place among the rising generation. In 1846, while exploring in the mountains of the north-west Coast-range of British Columbia, I fell in with some native hunters engaged in the chase of the Mountain-goat. Their implements were the bow and arrow—the *arrow* headed with, I believe, an exact counterpart of fig. 8. Even at that time most of the tribe (the Sillooett) had guns and ammunition; but they told me they preferred the bow and arrow for their present purpose, since the Goat, if not killed on the spot with the bullet, was frequently enabled to reach places inaccessible to the hunters before succumbing; while with the arrow, even though not instantaneously killed, the progress of a wounded animal was more effectually hindered[2]. They told me, too, that the *bone* arrow-heads were used by them chiefly, if not exclusively, in the chase of the Goat, and that when using the arrow for other purposes the ordinary arrow-head of stone or iron was employed. But, as I have said, the use of the bow and arrow among the tribes generally has become very rare comparatively, and the arrow-heads of flint, with the knives and adzes of stone, &c., are now even here a rarity. The larger implements figured on the same sheet are, I believe, spear-heads. In B. Pl. II. fig. 5, there is a Deer transfixed apparently by a spear of this description[3]. I infer that spears were planted in a "run-way," inclined at the proper angle, and that the driven herd, in its effort to escape, rushed against the hidden danger, where some were impaled. This inference would, I think, explain the object of fig. 7, in connexion with fig. 5. There is a painting at Pompeii (engraved in Mazois[4]) of a gladiatorial

combat, where this mode of spearing an animal is illustrated. It is figured in Kitto's 'Pictorial Bible,' among the notes to "1 Corinthians"; and if you can conveniently refer to it you will find the animal, as there figured*, transfixed almost similarly to that in fig. 5. Most of the other fragments in the same Plate seem to have had reference to scenes of hunting or fishing; but in their incomplete state it would be hard to assign to them any special use. I am disposed to regard them merely as fragments of implements similar to the large ones figured in the double Plate B. III. & IV.

In this Plate, fig. 1 is analogous to the sabres (or clubs) of horn which are, or were, in common use among the North-American Indians. These are called by the French-Canadian voyageurs *Puck-á-maugan* (literally "*Strikers*"), a name originating with Cree Indians of the Saskatchewan and elsewhere. These pucka-maugans are really blunt swords of horn, which can hack and bruise severely, and inflict even fatal blows[5]. There is usually a perforation near the lower end of the hilt, for the facility of passing a cord through, so that the implement may be suspended from the wrist when not directly in use—a sword-knot, in fact. The perforations in figs. 1 and 4 (admitting my assumption of the uses of the weapon to be correct) I consider to have been made for the same purpose. But I am at a loss to assign a reason for the *series* of holes that appear in figs. 5 and 6 *a*. The engraved lines I regard as ornamental tracings,—though possibly the figures on fig. 1 may have had an object and a significance which it would be fruitless to attempt to explain. I might possibly suggest that, admitting the use of these implements as *weapons* (or in some cases their application to other purposes, as in the case of the "British-Columbian" horn), the special ornamentation may have been designed to distinguish them as trophies of the chase. A custom analogous to this existed, we know, among the Germans in regard to the horns of the Urus†. Taken in pitfalls, the horns of these animals conferred celebrity on their captors; and, highly ornamented, were carefully preserved. I believe that some of these relics of the past still exist among the old German and Swiss families. The carved horns which you allude to as being found among the natives of Queen Charlotte's Island (and elsewhere, I may add, along the north-west coast) are grotesque and highly elaborated works of native art. These are usually the horns of the common white Goat, found in all precipitous ranges

* In this case the spear appears to have been held in position by the gladiator, who is seen escaping adroitly aside. Probably the figure represents a German captive doomed, as of wont, to the sports of the arena.

† See Cæs. de Bel. Gal. vi. 28.

dependent on the Rocky Mountains and the mountainous line of the North-west Coast (not the animal known as the Rocky-Mountain *Sheep*, which is the Big-horn or Ashaka, common in the Rocky Mountains and their immediate spurs, but not found in the vicinity of the coast). Some of these carvings have a useful purpose—*i. e.* the larger ones as cups or ladles, the smaller as spoons. Others, carved throughout their original form, and sometimes inlaid with the *nacre* of the pearl-shell, have in many cases a superstitious interest connected with them, and may indeed be regarded sometimes as the *Penates* or *Teraphim* of a family. I say sometimes; for though the goat-horn is perhaps preferred as a convenient material by many, others select a different substance, such as the hard wood of the crab-tree, the teeth of the Walrus [6], or the soft pipe-stone common along the coast, as the material whereon to exercise their ingenuity; and thus the carving, and the associations connected with it, convey the superstitious reverence irrespectively of the material. But there is very little resemblance between these works of art and the Aquitanian carvings. Usually they are very grotesque, with traits of similarity pervading the whole of them. In some the family mark is conveyed (corresponding to the "*totem*" of the Ojibways of Canada, of which you will doubtless find a description in Mr. Schoolcraft's work). This, for instance, is in one particular case that occurs to my memory a pair of "Fishers" (the large variety of the Marten or Sable), or rather a grotesque imitation of those animals, rivalling our own heraldic caricatures. In some cases pairs of Fishes, as you mention (see also page 13, *note*), may be employed. But in any case, where no useful purpose is obviously assignable to such carved relics as above described, I should be disposed to consider them to be superstitious emblems, analogous to the "teraphim" of old, or family insignia*. A friend of mine who possesses one of these horns has promised to send it to me in order that I might send you a sketch of it. If it reaches me in time I will do so, though I do not think it will tend to elucidate materially any special point. Meanwhile, however, I will sketch from fragments, assisted by memory, some articles in horn and other material, in present or past use among the natives, which, by affording a point of comparison, may possibly tend to assist your inquiry.

* And, of course, as family insignia, expressive of distinction, as you suggest, when borne by the chief or head of the family. At public feasts, on the North-west Coast, hereditary carvings—badges of authority blended with some superstitious *prestige*—are commonly borne by the chiefs in their dances of ceremony.

Description of the Figures.

Fig. 16. Knife handled as a double dagger.
Fig. 17. Knife handled for cutting (used as a Drawing Knife).
Fig. 18. Knife handled as a dagger.
} Fastened with thongs of deer-skin parchment applied in a wet state. Figs. 16 and 18 have cords for the wrist.

Fig. 19. An Axe or, rather, large Chisel, used for felling trees. The material is a hard dark-green or blackish stone, which I take to be hornblende. N.B. Flint, obsidian, agate, &c. are used for arrow-heads and other purposes, according to the circumstances of the locality.

Fig. 20. An Arrow-head of agate. Spear-heads and knives of analogous material are commonly found in the vicinity of ancient villages in different parts where the earth is disturbed. Frequently of felspar, I think.

Figs. 21 and 22. Adzes (formerly of stone) with handles of various shapes, of which two are here represented. Tied on with leathern thongs.

Fig. 23. A Stone Pestle for crushing fish-roes or other substances. Frequently for pulverizing bones, so as to extract the marrow by boiling.

Fig. 24. Whip-handle of Wapiti deer-horn (the horns of young bucks are selected), used among the interior tribes who possess horses. The thong fastened into the hollowed but-end with a peg, as shown. These horn whip-handles are frequently much ornamented with fanciful tracings. There is a perforation at the upper end for the wrist-cord, so that the bow and arrow or gun may be used on horseback without losing the whip.

Fig. 25. There are Bone Awls for ordinary purposes of various simple shapes, which can readily be imagined. The one figured is in use for sewing bark canoes: a large awl having a hook near the end, by means of which the *wattape* (root-fibre with which the canoe is fastened) can be drawn through the perforation.

Fig. 26. A Bone sharpened for taking off the hair from deer-skins in dressing them. Stone and bone or horn implements of various forms—*but all made thin at the edge*—are used for this purpose.

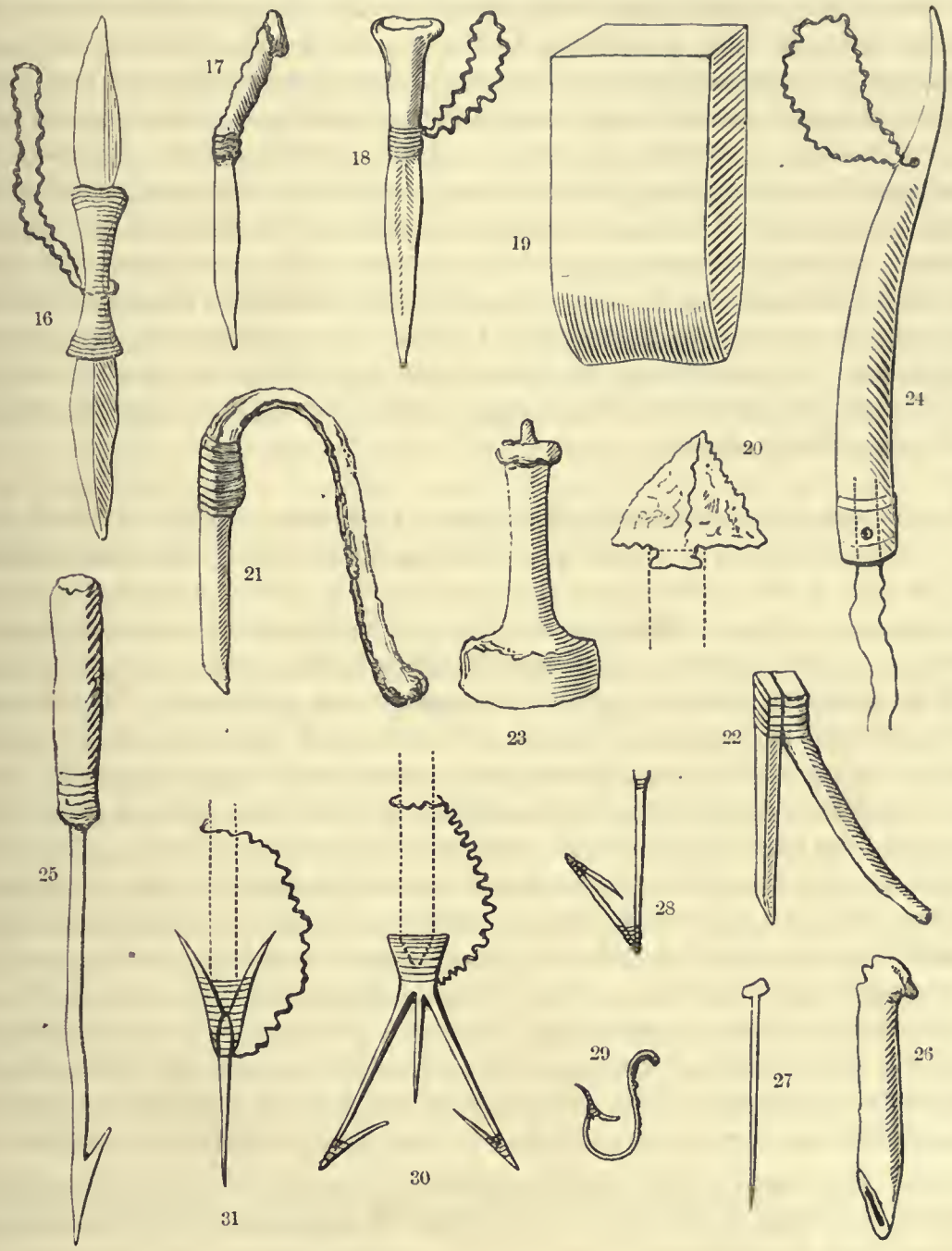
Fig. 27. A Bone Pin (the *spina* of Tacitus).

Figs. 28 and 29. Fish-hooks of bone, or wood and bone combined. The fastenings of all implements intended for use in the water are of cedar-bark or other vegetable fibre.

Fig. 30. A Fish-spear. Fig. 31. A Fish-spear of a simpler kind. In both cases the haft fixes into a socket, as shown. When withdrawn, the fish is retained by the connecting cord.

Figs. 16–31.

North-American Implements of Stone, Metal, Horn, and Bone.



In addition to the above, I may indicate hastily various simple implements formed of horn and bone :—A large piece of the but of a horn, perforated through the centre, *like a crutch-head*, for inserting a stout crooked crab-stick used for digging roots, the sharp point being hardened by fire for the purpose. Bones, or horns, wedge- or chisel-shaped, for various purposes—among the rest very generally for stripping the soft tender sap-wood of trees during early summer for food. In the interior the Scotch Fir and the Aspen chiefly. Along the coast the Hemlock (*Pinus Canadensis*), the under sap-wood of which is made into a kind of bread. (A practice of the same kind exists, I think, in the North of Europe, and, I fancy, existed in Germany &c. of old, as now, in some shape, among most barbarous tribes. Hence it is more than probable that among the relics found at Dordogne some implements, either of horn or bone, adapted for this purpose will appear.) Stone mallets. Perforated stones, probably for use with a cord, like a sling. Pebbles that have undergone the action of fire, used for boiling meats, &c., in bark vessels.

In the hope that the imperfect explanations I have been enabled to furnish will be of some service, I will remark generally that I shall watch with great interest the solution of the problem in which you, and the other gentlemen connected with you, are engaged. The relics of which you have sent me copies are unquestionably of a date anterior to the age of Cæsar or Tacitus. This must be inferred from the primitive material of which the weapons are composed. The existence of the *Reindeer* in Germany in the age of Cæsar is sufficiently proved by his own words; but no evidence has, I think, been adduced *until now* to show that they ever extended into the most southern province of Gaul; and indeed I think they could not have been in the habit of migrating thither in Cæsar's day, or he would have mentioned the fact*. In his description of the animal as then existing in Germany there is a mixture of truth and fable, which shows that, having probably himself seen a single antler and some skins, he was indebted to other persons for the remainder of the picture. Yet, putting the fabulous portion aside, there can be no question that he means the Reindeer. I mean in that passage of the 6th Book which begins "Est bos cervi figura," &c. Apart from the idea of the *Unicorn*, the description of the Reindeer is not inapt; and this we may the more readily allow when we read the next passage, describing the well-known

* On the contrary, Cæsar, talking of the Hercynian Forest, says distinctly, "Multa in ea genera ferarum nasci constat, *quæ reliquis in locis non sint*: ex quibus," &c., and then goes on to describe the Reindeer, the Urus, &c. (Bel. Gal. vi. 25).

Elk in terms the most unreal and extravagant. Besides, Cæsar talks of the skins of the *Rheno* thus:—"*et pellibus, aut parvis rhenonum tegumentis, utuntur,*" &c.[7] I am aware that some diversity of interpretation has existed in regard to this passage; but it seems to be clearly thus:—"they use the skins of Reindeer (*rhenones*) to cover themselves, or small vestments made of the same material." The name, too, given by Cæsar, a Latinization of the Saxon "Ran," is another proof. Hence the modern French *Renne*, and our own Reindeer. I might multiply illustrations, but will confine myself to saying that the term "Rhenones" (which other authors, while dubious of its true signification, explain as being a word of German origin) appears to have been applied by Cæsar to the skins used for the garments in question, and to the animals which yielded them, but that afterwards, when describing the same animal, albeit inaccurately, he does not appear to have identified it with the animal of which he had previously spoken and had actually named[8]. The recent discoveries not only corroborate the fact that the Reindeer (or Rheno) existed in localities where they are now extinct, but prove that they at one time existed in a region far to the south of the locality where Cæsar describes them as existing in his time—in the interior of Gaul namely, and up to the slopes of the Pyrenees[9].

I have been insensibly led to dwell on particulars which will doubtless not have escaped the notice of yourself and your learned coadjutors; a feeling of curiosity, however, has prompted me to consider the subject more fully than when I sat down (yesterday) to reply to your letter; and it has struck me that some facts that have come under my own observation during a long residence in the North-west of America, in regard to the migration and disappearance of races of the larger animals from localities where they were once numerous, and the consequent changes of place of tribes, or portions of tribes, to which they yielded a subsistence, may tend to aid a solution of the Aquitanian problem. I may be pardoned, then, if I dwell for awhile on the subject before concluding. And I will set out by at once broadly stating my impression that the Cave-race who once inhabited the southern region were similar in habits, and indeed identical with a portion of the Germans as described by Tacitus,—that, inhabiting Aquitania, and subsisting chiefly with the products of the chase, they dwelt in caves either naturally formed or artificially hollowed—even as the Germans of a later day, as described by Tacitus, who says, "Solent et subterraneos specus aperire, eosque multo insuper fimo onerant, suffugium hiemi, et receptaculum frugibus," &c. (Germ. xvi.),—that at the period (a vague one) in question the lowland forests of Gaul—as of Germany

in Cæsar's time, and as now in parts of Northern Europe and in the corresponding latitudes of North America—were the resort of vast herds of Reindeer, which periodically, during the summer months, migrated towards the mountains [10], driven thither as a refuge from the flies, of whose attacks they are peculiarly susceptible, and especially those of a species of Gad-fly (the *Œstrus tarandi*),—that in these migrations a sufficient number were slaughtered to afford an important amount of food and clothing to the inhabitants, eked out by the yield of their flocks and herds and other local resources,—that with the increase of inhabitants the supply gradually decreased, and that under constant molestation the herds retreated northwards towards the less frequented or more spacious forests bordering on the Northern Alps,—that a portion of the inhabitants, with their nomadic habits, followed the migrations of the retreating herds, and took possession of other lands where they could enjoy their favourite pastime and obtain their wonted supplies—displacing the previous inhabitants, who were unable to resist them, or possibly in time amalgamating with them.

This, *mutatis mutandis*, is almost literally the history of tribes of men, and races of the larger animals, in North America. There are parts where the Reindeer (once numerous) are no longer found,—others where the bones of the Bison alone indicate their once having occupied the land, but whence they have disappeared within the last fifty years, or within the last ten, or the last five years [11]. But there is in the present case an end, I think, to speculation on the subject when we refer to Cæsar—the surest guide, with Tacitus, in all that relates to old Gaul or Ancient Britain. He says (Bel. Gal. lib. vi.), "Ac fuit antea tempus, quum Germanos Galli virtute superarent, et ultro bella inferrent, ac propter hominum multitudinem agrique inopiam trans Rhenum colonias mitterent. Itaque ea, quæ fertilissima sunt, Germaniæ loca circum Hercyniam sylvam . . . . . Volcæ Tectosages occupaverunt, atque ibi consederunt. Quæ gens ad hoc tempus iis sedibus sese continet, summamque habet justitiæ et bellicæ laudis opinionem: nunc quoque in eadem inopia, egestate, patientia, qua Germani, permanent; eodem victu et cultu corporis utuntur, &c."* This emigration is set down by Livy (as quoted in the notes to the Delphin edition of Cæsar) as having taken place under Ambigatus, King of the Biturigcs, who appears to have been contemporary with Tarquinius Priscus, and consequently to have lived between 500 and 600 years B.C., or about 500 before the age of Julius Cæsar.

* He continues to say that those of the Gauls (*i. e.* of the Volcæ Tectosages) who did not emigrate, gradually lost their primitive habits (retained by the others) through the propinquity of the province and the introduction of foreign commodities or luxuries. Their valour, too, became impaired through the same causes.

We are thus, in the consideration of this subject under the assumption I have advanced, thrown back about 670 years, at the least, anterior to the time when Tacitus wrote; and even at that comparatively late day horn or bone, as well as stone implements and weapons of war, must have been largely used by the "Germans," whom, as before shown, I assume, allowing for the changes of time, to represent the ancient people of Aquitaine. I mean particularly that portion of the great German race who inhabited the neighbourhood of the Hercynian Forest—the descendants of the Voleæ *Tectosages** who migrated thither, as told by Cæsar. Tacitus says, "Ne ferrum quidem superest, sicut ex genere telorum colligitur[12]. Rari gladiis, aut majoribus lanceis utuntur: hastas, vel ipsorum vocabulo *frameas* gerunt, angusto et brevi ferro, sed ita acri, et ad usum habili, ut eodem telo, prout ratio poscit, vel cominus vel eminus pugnent" (Germ. vi.). But afterwards we find (I quote from Relhan's notes to Brotier's edition), "Postea, cum ferrum abundaret, Germani *gladiis* præcipue usi sunt." And again, "Cum ferrum apud Germanos abundavit, non frameis vel hastis, sed longis acutisque gladiis usi sunt," &c., to the same end. Hence I infer that even in the days of Tacitus horn weapons for striking, such as are figured in B. Plates III. & IV., were used by the Germans. These the Romans did not dignify with the name of *swords*. The *swords* alluded to by Tacitus as being "rarely used" were doubtless the short straight Roman weapon, obtained in various ways, which, of course, with those who were fortunate enough to obtain them, supplanted the unwieldy prototype of horn. These, again, as civilization advanced and iron became common, gave way to the enormous two-handed weapons which characterized the warfare of the Middle Ages, and which, in the hands of the descendants of the Helvetii, committed such havoc amid the ranks of Burgundy upon the fields of Granson and Morat.

I omitted to remark that the horn which you describe as having been sent from British Columbia is more probably that of what is here *miscalled* the Elk than that of the Reindeer[13]. This *Elk* of the north-west coast is in reality a variety of the *Cervus elaphus*, and is, I think, distinguished by naturalists as the Wapiti. It attains to an enormous size in these localities; and its antlers are applied by the natives to many useful purposes. The Reindeer is not found upon this portion of the coast; though approaching Behring's Strait, it appears to winter in close proximity to the sea-board. Further south it frequents the Coast-range of moun-

* Lemprière says that the Voleæ of Aquitania received the name of Tectosagæ, *quod sagis tegerentur*. Compare Tacitus, Germ. xvii. Tegumen omnibus sagum, &c.

tains and all the *interior* parts of British Columbia north of a certain latitude. This leads me to draw your attention to the close correspondence, in point of latitude, of its former habitat in Europe, proved by the recent developments in Dordogne, with the localities to which it is indigenous on the Atlantic coasts of America—that is, about lat. 43°; south of which I do not think it was found in America—at least not far. Upon the Pacific coast, however, the Reindeer or Caribou takes a more northern range. It may occasionally come somewhat further south than 49° in the interior, along the borders of the Rocky Mountain range; but my own experience would lead me to place that (49°) as the limit—that is, the limit imposed by the various exigencies of its nature. Nearer the coast I should be inclined to limit its southern range by lat. 51°, or thereabout. In part explanation of this disparity, I may remind you that there is a difference of *winter temperature* in favour of the Pacific coast, as compared with the Atlantic, equivalent to at least 10° of latitude. Reindeer have never, in America, been herded in a domestic state, as is done by the Laplanders and others of Northern Europe; nor are they by the natives employed as beasts of draught. They exist only in their wild and natural condition. The late Lord Selkirk, actively interested at the time in the affairs of the Hudson's Bay Company and the Red River Colony, introduced some Norwegian experts with the view of employing the Reindeer largely for winter transport. The project, however, did not result satisfactorily, owing to various local causes. In one of the District-reports to the Council of the Hudson's Bay Company sitting at Norway House, some years ago, I noticed that the Officers of H.M.S. 'Plover,' had been, as they reported, when wintering in Wainwright Inlet, supplied by the natives with "abundance of Reindeer venison from their herds in the mountains." But I do not doubt that there was a misapprehension here, and that what the sailors supposed to be the yield of domesticated herds, corresponding with their preconceptions of the Laplanders &c., were really the wild deer of the forest[14]. So with the Germans; and so, inferentially, with the people of ancient Aquitania; for there is nothing to authorize the supposition that they (the Germans) *tamed* the Reindeer for domestic purposes, but only hunted it. Small cattle, sheep, and goats, with horses, composed their riches—their *pecora* and *armenta*. The Reindeer, the Urus, the Elk, the Boar, &c. were *feræ* of the forest. Indeed I very much question whether the Laps, Fins, &c. *domesticated* the Reindeer until a comparatively late date—warned thereto by necessity arising from experience of the fugitive nature of the resource in a wild state, exemplified in the case of the southern races, and encouraged to it by the peculiar facilities and advantages

offered to them by their country and its climate, so consonant with the habits and nature of the animal. Any theory, therefore, that might be based upon the disappearance of the Reindeer from southern latitudes, in connexion with the migration northward in remote ages of the past of the Esquimaux and other northern tribes, ought, I submit, to be very cautiously entertained. Nor would it be prudent, I think, to found too much upon the similarity of implements now, or recently, in use among divers barbarous nations, and the interesting relics which have been discovered in Dordogne. I will not call this an *accidental* similarity; for there is in this, as in all other mundane things, a deeper influencing cause than that which men call "accident." The same Power which endows the inferior animals with the perceptions necessary to the conservation of life, and which in them we call instinct, prompts Man likewise in his primitive state with certain innate conceptions in regard to the elementary objects necessary to the same end. Thus I believe that under similar circumstances and conditions of things, isolated branches of the human race will arrive, in simple matters of domestic or offensive art, at nearly similar conclusions, each independently of the other. I say this without reference to that transmission of example which has of course gone on from age to age, and which has extended necessarily with the human race in its various ramifications, no longer traceable, save by deduction, through the dim and mysterious vista of the past. It is with the slow and partial advance of civilization, modified by conditions of climate and other influences, that the genius of nations, and the broad deviations in manufactures from a common and primeval type, are tardily developed.

I wrote a few years ago at the request of a scientific friend a few notes regarding the Indian tribes of America. These, falling under the notice of the Historical Society of New York, were afterwards printed by them, and some copies sent to me. I find that I have still two or three remaining, and send you one herewith. These notes bear, if at all, very remotely on the subject of your communication; but they may possibly contain something that may be suggestive to your antiquarian friends, interested in tracing the spread of races. It is, however, time that I should conclude; and I do so with a renewed expression of the warm interest I feel in the progress of your present undertaking—important, in more senses than one, to all reflecting persons. I need not say that I shall cheerfully contribute, if in my power, to promote the end in view by answering any further queries you may find it expedient to put; and I shall in any case trust to hear from you, however briefly, in reference to the subject and the progress you have made in your investigations. I should like, too, to learn in

how far you agree with me in the view I have taken of the matter under the superficial consideration I have been enabled to give to it. Meanwhile believe me to be,

Dear Sir,

Yours very truly,

ALEX. C. ANDERSON.

T. Rupert Jones, Esq., Professor of Geology, &c.,
Royal Military College, Sandhurst.

APPENDIX TO MR. ANDERSON'S LETTER.

[1] Together with this horn chisel from Mackenzie River (fig. 15, p. 37) we here figure (also in reduced outline) a similar but more perfect specimen of the Indian "Puck-â-maugan" (or "Pogamagan," as Mackenzie terms it) which was brought by Gordon A. Thomson, Esq., from Sitka, as an implement with which the Indians knocked game on the head, and presented to the Museum at Belfast, where Mr. Franks lately saw it. This specimen is covered with leather on the upper part, and has a leathern string or shoulder-strap, reaching from the top to a hole in the end of the projecting remnant of the brow-antler. See fig. 32.

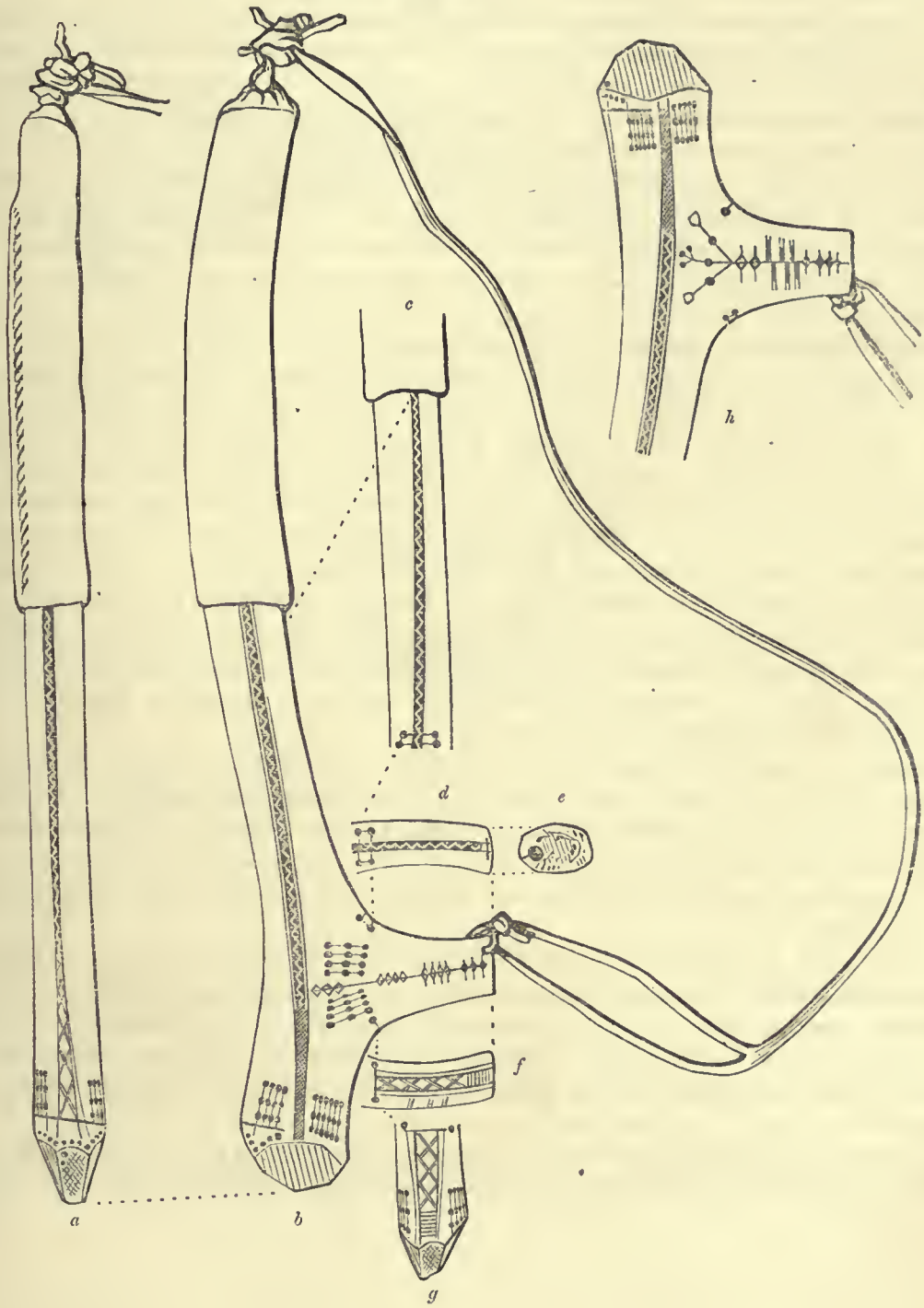
The following extracts (kindly supplied by Mr. T. K. Gay) from works descriptive of travels in the high latitudes of North America contain information as to the implements under notice, as well as remarks on the use of instruments of stone, bone, tooth, &c., which elucidate to some extent the probable habits of the ancient people of Périgord, whose implements and weapons we are illustrating in this book.

Extract from 'A Journey to the Northern Ocean,' by SAMUEL HEARNE (8vo, Dublin, 1796).

Hearne, speaking of a woman of the tribe of the Western Dog-ribbed Indians, who had been taken prisoner by the Athapuscow tribe, and had managed to escape from them, and was discovered by Hearne's party to the south of the Athapuscow Lake, where she had subsisted herself for seven months by snaring rabbits, partridges, etc., and had built herself a hut to live in, says (p. 267), "In a conversation with this woman soon afterward, she told us that her country lies so far to the Westward that she had never seen iron, or any other kind of metal, till she was taken prisoner. All her tribe, she observed, made their hatchets and ice-chisels of Deer's horns, and their knives of stones and bones, that their arrows were shod with a kind of slate, bones, and Deer's horns; and the instruments which they employed to make their wood-work were nothing but Beavers' teeth. Though they had frequently heard of the useful materials which the nations or tribes to the East of them were supplied with from the English, so far were they from drawing nearer, to be in the way of trading for iron-work &c., that they were obliged to retreat farther back, to avoid the Athapuscow Indians who made surprizing slaughter among them, both in winter and summer."

Figs. 32 *a–h.*

A perfect Specimen of a "Puck-â-maugan," from Sitka, North America. Several views (*a–h*) of the stem and branch, showing the details of ornament, the leathern cover, and the strap for suspension, are here given. (Reduced to one-third of the natural size.)



Extracts from the 'Voyages through the Continent of North America to the Frozen and Pacific Oceans, 1789 *and* 1793, *by* ALEXANDER MACKENZIE' (4to, London, 1801).

At page cvi (Account of the Knisteneaux Indians), "A sharp flint serves them as a lancet for letting blood, as well as for scarification in bruises and swellings."

At pages 37–38 (Account of the Slave and Dog-rib Indians on the Mackenzie River), "They likewise make lines of the sinews of the Reindeer, and manufacture their hooks from wood, horn, or bone. Their arms and weapons for hunting are bows and arrows, spears, daggers, and 'pogamagans' or clubs. The bows are about 5 or 6 feet in length, and the strings are of sinews or raw skins. The arrows are 2½ feet long, including the barb, which is variously formed of bone, horn, flint, iron, or copper, and are winged with three feathers. The pole of the spears is about 6 feet in length, and pointed with a barbed bone of 10 inches. With this weapon they strike the Reindeer in the water. The daggers are flat and sharp-pointed, about 12 inches long, and made of horn or bone. The 'pogamagan' is made of the horn of the Reindeer, the branches being all cut off, except that which forms the extremity. This instrument is about 2 feet in length, and is employed to dispatch their enemies in battle, and such animals as they catch in snares placed for that purpose. . . . . Their axes are manufactured of a piece of brown or grey stone, from 6 to 8 inches long, and 2 inches thick. The inside is flat, and the outside round and tapering to an edge, an inch wide. They are fastened by the middle with the flat side inwards to a handle 2 feet long, with a cord of green skin. This is the tool with which they split their wood, and, we believe, the only one of its kind among them. They kindle fire, by striking together a piece of white or yellow pyrites and a flint stone, over a piece of touch-wood. They are universally provided with a small bag containing these materials, so that they are in a state of continual preparation to produce fire. From the adjoining tribes, the Red-Knives and Chepewyans, they procure in barter, for Marten skins and a few Beaver, small pieces of iron, of which they manufacture knives, by fixing them at the end of a short stick; and with them and the Beaver's teeth they finish all their work. They keep them in a sheath hanging to their neck, which also contains their awls both of iron and bone."

At page 59 (speaking of some untenanted huts of the Esquimaux near the mouth of the Mackenzie River), "A square stone kettle, with a flat bottom, also occupied our attention, which was capable of containing two gallons; and we were puzzled as to the means these people must have employed to have chiselled it out of a solid rock into its present form. To these articles may be added, small pieces of flint fixed into handles of wood, which, probably, serve as knives."

[2] M. Marcou, so well known by his excellent works on Geology and his travels in North America, has informed me of his having in New Mexico met with hunters, of Spanish origin, who had abandoned the gun of their ancestors and taken the bow and arrows of the Indians. The loud report of fire-arms frightens away all the animals round about; whilst with the bow and arrow the hunter, stealing upon his game, can hit many successively before being seen.—E. L.

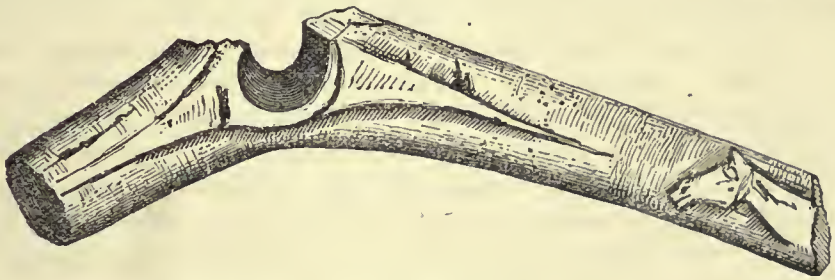
[3] To me it still appears probable that the particular stroke alluded to by Mr. Anderson in the figure noticed (fig. 5) is merely a copy of an accidental scratch on the original specimen.—E. L.

[4] Portion of fig. 3, in pl. 32, of the First Part of 'Les Ruines de Pompeii,' par L. Mazois (fol. 1824). The but of the spear is here represented broken, not pointed as it appears in Kitto's copy.—T. R. J.

[5] Some of these stems of Reindeer antlers, ornamented and pierced, are really too light and

Fig. 33.

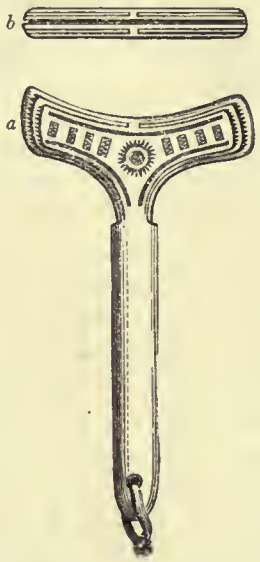
Carved and perforated piece of Reindeer's Horn, from the Rock-shelter at La Madelaine.



slender to have served as weapons or any other instruments of percussion. Among our specimens of these ornamented horns from Périgord there are some without any perforation; others have

Fig. 34.

Sketch of a Lapland Implement for tapping the Magic Drum, in Dr. G. Klemm's Collection. (Reduced to one-third.)



a, Side view. *b*, Top view.

This Drumstick is made from a Horn; and the zigzag ornament and other black lines are filled in with pigment. (For this Sketch we are indebted to Professor Grüner, of Dresden.)

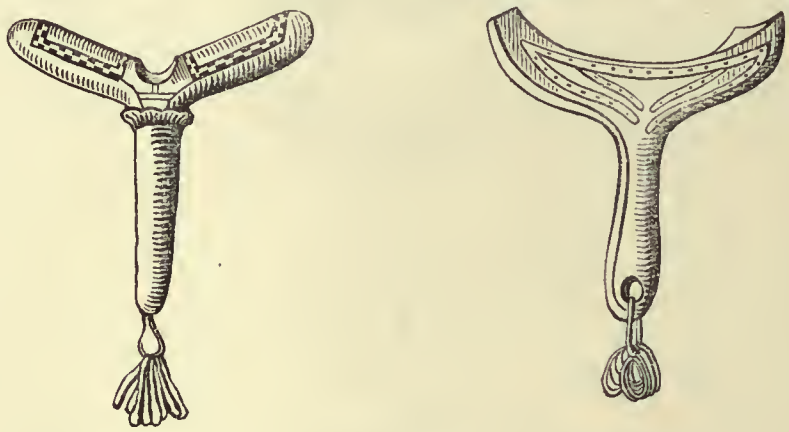
one, two, three, or even four holes (see B. Plates III. & IV). The making of these holes had

surely some meaning; for in certain specimens, to make the hole, it has been necessary to destroy a portion of the figures which had already been carved.—E. L.

A Lapland drumstick (or hammer-like implement used for tapping the Magic Drum) in the Dresden Museum, and another in the Museum at Geneva, have been noticed by Mr. Franks, during visits made last year, to be made of a piece of Reindeer-horn, where a branch goes off at right angles from the beam of the antler, the former being the handle, and the hammer-like part, or head, consisting of the latter; whilst the triangular portion, where branch and stem meet, is perforated with a round hole, reminding us of this style of ornament in the implements from Dordogne, figured in B. Plates III. & IV., though the perforation has not the same relative place in all the latter specimens. The Lapland tapping-sticks are described in J. Scheffer's 'Lapponia' (Frankfurt, 1673), p. 131, as made of Reindeer's antler; and the two figured by Scheffer at page 125 consist of similar parts of the antler, where a branch goes off at right angles from the stem, and the broad portion where they meet has in one case, it seems, been either carved into a semicircular notch, or perforated and then pared away until only one half of the hole is left. This specimen (see fig. 35) has a running ornament of the "key-pattern"; and one in Dr. G. Klemm's Collection, at Dresden, shown in fig. 34, p. 53, has, besides the hole (which is encircled with a radiate pattern), zigzag marks for ornament, somewhat similar to those borne by the North-American horn implements (figs. 15 and 32). The two figures given by Scheffer are here reproduced in figs. 35 and 36. The wizard tapping the drum at page 139

Figs. 35 *and* 36.

Copies of Scheffer's figures of the Hammer for tapping the Magic Drum of the Laplanders.



of Scheffer's 'Lapponia' holds in his hand a hammer that may be either one of the above (allowing for difference of scale), or a terminal piece of an antler where it branches at the end symmetrically and nearly horizontally, as is not unusual.—T. R. J.

[6] The ear-bone, or *os petrosum*, of a Whale, carved with numerous entangled human figures, brought from the region under notice, is preserved in the collection of A. G. Dallas, Esq., of the Hudson-Bay Company.—T. R. J.

In the Philippine Islands it is, according to M. Roulin, the "rocher" or "os petrosum"

of the Dugong which is employed as a talisman. That of the Manatee (Lamantin) is sought after for the same purpose by the Indians of the Amazon, and by the people inhabiting the eastern coast of South America. In the more ancient caverns of France (those in which Man is found contemporary with the great Bear, the great Lion, the Hyena, Mammoth, and Rhinoceros) it is the "os petrosum" of the Horse and the Ox which occurs prepared and worked in many ways for ornaments or amulets. The caverns of Aurignac, of la Chaise (Charente), des Fées (Allier), of Vergisson (Saône et Loire), have yielded numbers of these specimens. Up to the present time, however, we have not observed them in any caves of more recent date, where the remains of Reindeer predominate, with objects of arts and of more advanced industry.—E. L.

[7] This reading of Cæsar is not found in every edition. That the common article of dress, here alluded to, should have been made of the skins of young Reindeers, it would be necessary for the animal to have been very common in the countries inhabited by the "Germani." How, then, could Cæsar, who had called it by its name "Rheno," describe it, a few lines after, as a sort of deer-shaped Ox ("est bos cervi figura," &c.) without recalling its name or the use made of its skin. Sallust, who wrote after the death of Cæsar, speaks of the "Rheno" as if it were a garment and not an animal—"intectum rhenonibus corpus tegunt." Isidore of Seville gives the same interpretation—"rhenones sunt velamina humerorum atque pectoris usque ad umbilicum, atque intortis villis adeo hispida ut imbrem respuant." This also is the opinion adopted by other scholars. M. Quicherat ('Dict. Latin-Franç.') remarks on the word "Rheno," that it was a simple waistcoat (gilet) made of sheep-skin. At our Universal Exposition of 1867 I observed this same "Rheno" or tunic of sheep-skin, with the wool turned inwards, on the life-sized models showing Swedish costumes, exhibited in the Swedish Section.—E. L.

[8] The following observations written lately by Mr. W. Boyd Dawkins, F.R.S., quite independently of the remarks on the subject communicated in Mr. Anderson's Letter, are here appended as adding considerably to the interest of this portion of the 'Reliquiæ Aquitanicæ.'—T. R. J.

"If we turn to History, we shall see that the animal [the Reindeer] has been retreating northwards at least during the last two thousand years. In Cæsar's time it dwelt in the great Hercynian Forest that overshadowed Germany. He describes it as* 'an ox in the shape of a stag,' and as 'having one antler springing from the middle of its forehead, between the ears, loftier and more directed forwards than any known to the Romans. From its palm-like top branches spread widely. In both male and female there is the same nature, the same form and magnitude of antlers.' This description has been considered by many of no value at all, and as the pure invention of Cæsar's brain. It seems to me, however, a very natural explanation of the difficulties of the passage, if we suppose that Cæsar described the animal partly from hearsay and partly from a rude sketch and profile. In the latter case, unless the drawing were in correct perspective, the animal would

* "De Bellico Gallico, lib. vi. cap. xxvi. 'Est bos cervi figura, cujus a media fronte inter aures unum cornu existit, excelsius, magisque directum his quæ nobis nota sunt cornibus. Ab ejus summo, sicut palmæ, rami quam late diffunduntur. Eadem est fœminæ marisque natura, eadem forma magnitudoque cornuum.'"

appear to be possessed of one horn only; and therefore he might legitimately describe it, in times when a belief in all kinds of monsters was current, as possessed of one horn. To this imperfection of drawing many of the monsters in the natural-history books of the Middle Ages may most probably be traced. It is not at all reasonable to suppose that Cæsar himself ever saw a Reindeer; for he describes the Hercynian Forest as stretching far beyond his ken; then he proceeds to enumerate the animals that are found in it. The Germans, however, in his time were well acquainted with the Reindeer; for in the 21st chap. of the 6th Book of his 'Commmentaries' he writes that they use small skins of Reindeer, 'parvis rhenonum tegumentis utuntur,' a passage in which 'rhenones' is the Latinized form of the word that is now current as 'Rennthier' (Swedish 'Rendjur'), and which is preserved in the Romance word 'Renne,' the root-meaning being found in the German 'rennen' to run*. When the Teutonic invaders of Europe advanced northwards and westwards in the Hercynian Forest, they met with an animal altogether strange to their eyes; they were struck with its running-powers, and so they termed it the *running* beast, and thus the animal acquired a name. Other writers of antiquity, such as Pliny, Solinus, and Ælian speak of an animal which they term 'Tarandus'; their accounts, however, are purely mythical, and it may have been an Elk, or, as Gesner believes, a Polish 'Thur,' as reasonably as any other animal†. In Cæsar's description the uprightness of the horns shows that he meant the true Reindeer and not the Elk."—"*On the Former Range of the Reindeer in Europe,*" in 'The Popular Science Review,' No. 26, January 1868, pp. 40, 41.

[9] The Reindeer must have retired from Western Europe by gradual stages. It has been noted as fossil in the peat-bogs of Pomerania, which are regarded as of a more recent age than the deposits of our caverns, where this animal has left such abundant remains; and, adopting the calculations cited by M. Grewingk ('Ueber die frühere Existenz von Rennthieren in den Ostseeprovinzen,' &c. 1867), the Reindeer perhaps existed in Livonia 600 or 1200 years ago.—E. L.

[10] After the very many observations which we have been able to make, in the caverns and rock-shelters of Périgord, on the remains of Reindeer, slain in all seasons and at every age (judging by the state of their antlers still attached to the frontal bones), we must conclude that this animal had a permanent habitat in that region. At the time of the Glacial Epoch, as well as before and after, in the mean latitude of Europe of the Quaternary Period, the more humid climate may have had less extreme seasons, the summers being cooler than at present, not driving the Reindeer to take refuge in the mountains, and, on the other hand, milder winters, allowing the Hippopotamus to live in the rivers, which, fed by abundant rains, have left in wide-spread alluvia the witnesses of their enormous power.—E. L.

[11] Formerly ranging through nearly the whole of North America, east of the Rocky Mountains, the Bison is now confined to the plains west of the Missouri and along the slopes of the Rocky

* "That this is the true derivation is proved by the prominence which Olaus Magnus, Albertus Magnus, and Gesner give to its attribute of swiftness. Dr. Lee derives the name from the German 'rein' (clean), without, however, giving any reason."

† "Historia naturalis; folio, 1603, vol. i. p. 140."

Mountains. Some interesting remarks on the rapid decrease of the "Buffalo" are given by Dr. F. V. Hayden at pages 150 and 151 of the 'Report on the Geology and Natural History of the Upper Missouri,' 4to, Philadelphia, 1862.—T. R. J.

[12] We might still better quote the passage from Tacitus ('Germania,' xlvi.), where he says "Fennis mira feritas; fœda paupertas; non arma, non equi, non penates; victui herba, vestitui pellis; cubile humus; sola in sagittis spes, quas, inopiâ ferri, ossibus asperant."—E. L.

[13] This horn is not that of the Elk or Moose, nor of the Wapiti, but decidedly of the Reindeer; nor is this a matter of surprise, since it came from the neighbourhood of the Mackenzie River, where the Reindeer is said to abound.—E. L.

[14] In a letter dated July 29, 1867, Mr. Anderson courteously informs us that, "in regard to the remark made by me concerning the domestication of the Reindeer not being practised by the North-American tribes, I wrote to His Highness Prince Maksoutoff, the Governor of Sitka, requesting him to confirm, if in his power, my assertion, as far as concerns the tracts under his immediate jurisdiction. The reply he has favoured me with I now enclose (the duplicate), and you will observe that he fully supports the view I had advanced (this tract of country, you are aware, has since been transferred to the United States Government)":—

"Port of New Archangel, Sitka,
"17/29 March 1867.

"Alexander C. Anderson, Esq., Victoria, V. I.

"Sir,—In reply to your letter of 15 October 1866 with regard to domesticated herds of Reindeers on the N.W. Coast of America, I am very glad to be able to inform you on quite authentic grounds—(1) that the natives in the vicinity of Wainwright Inlet, Norton Sound, or elsewhere on the American shore of the Strait of Behring, do not domesticate the Reindeer at all; (2) and that any deer's meat supplied by the natives to vessels frequenting that vicinity is positively the produce of the chase.

"I am,
"With my best regards,
"Your obedient Servant,
[Signed] "P. Maksoutoff,
"*Governor of Russian Colonies in America.*"

[Note.—Reference should be made also to Professor Nilsson's opinion as to the *Framea*, mentioned by Tacitus (see above, p. 47), having been a lance pointed with iron (see Sir John Lubbock's translation of Sven Nilsson's 'The Primitive Inhabitants of Scandinavia,' 8vo, London, 1868, p. 195); also to his remarks on the Fins (Fenni) as stone-weaponed Cave-dwellers, detested by the Germanic race, *ibid.* pp. 219 *et seq.*; and on the Reindeer as described by Cæsar, and its extinction in Scania, *ibid.* pp. 249, 256.—Edit.]

V.

SOME OF THE IMPLEMENTS FROM THE CAVES OF DORDOGNE COMPARED WITH NORTH-AMERICAN-INDIAN TOOLS.

The following Letter, like the foregoing, was given in courteous reply to inquiries respecting the North-American Tool referred to at page 32 and page 37, and as to the possibility of Indian Implements and Habits being illustrative of the Dordogne specimens.—T. R. J.

4 Gladstone Terrace, Hope Park, Edinburgh,
October 22, 1866.

Dear Sir,—I have only just received from Dr. Balfour your note of the 22nd May, having but very recently returned from North-west America, and the uncertainty of my *locale* and the expectation of my speedy return to England having prevented your communication being forwarded to me. I, however, take the earliest opportunity of doing myself the honour and pleasure of affording you what information I possess (somewhat unsatisfactory, I fear) regarding the "native British-Columbian implement" you refer to.

Though very intimately acquainted with many of the aboriginal nations and tribes of North America, having resided and travelled amongst them (almost as one of their people) for a number of years whilst engaged as a Botanist and afterwards as Commander and Government Agent of the Vancouver's-Island Exploring Expeditions, I cannot recollect any implement in use amongst them *exactly* corresponding with the one figured and described in your letter, or in the supposed analogues figured in 'Reliquiæ Aquitanicæ,' B. Plate III. & IV. fig. 3. Though the Indians live to a great extent in the same state of barbarism which they did a hundred years ago, yet the introduction of iron weapons and tools amongst them by the Hudson's Bay Company and others has rendered obsolete most of the former rude weapons of bone and stone, so that these are very rarely seen except when accidentally dug up on the sites of their old villages. Even the tomahawks and the scalping-knives of the horse-tribes are manufactured in Birmingham and Sheffield, and imported for the Indian trade by the Great Fur Company.

I have, however, seen pieces of the horns of the Elk and other Deer, of a similar

or even (with the exception of the zigzag markings) identical form, used by the Indians for splitting the cedar logs, of the boards from which their lodges are made. They are used after the manner of a wedge, and are still used by many of the tribes living on the borders of the great forest which covered the western slope of the Cascade Mountains, and I have employed them for the same purpose in splitting cedar logs to make rafts for crossing lakes, &c., during my wanderings. The Cowichan Indians relate that once they used to live in holes in the ground until Hœlse (a being who under various names appears in all Indian traditions; he is the Quatiahk of the Western Vancouver-Island tribes, the Kŏmĭkŭnx of the Klamaths in Southern Oregon; and Longfellow has woven this and other traditions together in his poem under the Chippeway name of Hiawatha) taught them to make an axe out of the horns of the Elk which they caught in pitfalls, and wedges out of the stone, and so they cut down the great cedar-trees (*Thuja gigantea*, Nutt.) and made boards and canoes out of its trunk; and it was a sad thing for the poor Indian when he learned this fatal art, for then he went to war and travelled from home on the great lakes and the fiords and bays of the coast, and they have been decreasing ever since. Therefore on the whole I am inclined to think that the use of your "British-Columbian" implement was as a wedge for splitting trees, and that the portion of the "tine" was left projecting, either to add to its force, to hold it by, as a surface to apply the mallet against, or, just as likely as not, for no particular reason at all; for, as the Indian said of the white man, "he's very unsartain." The zigzag markings I cannot account for, unless they were formed when dressing the horn, the better to penetrate the wood.

Regarding the analogy of the implements figured in 'Reliquiæ Aquitanicæ,' such as B. Plate III. & IV. fig. 3, I cannot say much, the mishaps they may have undergone during the long period they have lain exposed having no doubt materially altered their original finish; and they may possibly have been used for the same purpose, notwithstanding the slight dissimilarity between them and the "British-Columbian" tool, savages not being very particular to have a rude implement, such as a wedge, always of one arbitrary form. I do not, however, doubt that the implement figured in Plate III. & IV. fig. 2 was of that nature, the conditions of life among the ancient savage coast-tribes of Europe and the present fishing- and coast-tribes of the shores of North America, particularly on the seaboard of the North Pacific, having, no doubt, been very similar, even to the wooded character of the country and many of the common animals of the chase; and it will be found that savages or men (such as explorers having to depend on

their own resources, and shipwrecked seamen) thrown under the same conditions of life, in a similar style of country, will instinctively strike upon the same adaptations of rude nature around them to assist them or to ameliorate their existence. I speak from hard-earned experience. For instance, the *stone era* (and it will perhaps be found that there was a *bone age* before the "stone" one) is just extinct among the Indian tribes of the north-west slope of the Rocky Mountains. I have collected many stone axes, scalping-knives, &c., of a shape almost identical with those being now disinterred in the Drift, &c.

Doubtless the lacustrine dwellings of Switzerland were formed for defence, against either wild beasts or wilder men, by some weak tribe; for I find traditions among the Indian races that they at one time erected similar edifices to protect themselves against an animal which ravaged the country long long ago. This, from description, was no doubt the Mastodon. I find the tradition identical among the Indians of the Snoqualami and Peace Rivers, who have no connexion with each other; but in both localities remains of that animal are found abundantly. The discovery of the remains of Man and implements of the chase among the bones of that animal, and even marks of the spears on the bones, with embers of the fires, leaves little doubt that the Mastodon was contemporary with Man. These were found, I think, in Missouri*; but I speak from memory, as I have been separated from books and civilization (unless of the rudest frontier description) for some years past.

The spears figured in 'Reliquiæ Aquitanicæ,' B. Plate I., were doubtless fish-spears, such as are used at this very day amongst the Eskimo and other rude races: some with reverted points, as in figs. 4? and 10, are used by the Eskimo as bird-spears (compound), so that if the main point misses, one of the side spearlets will be sure to strike.

The only other use of Deer-horns which I have seen was as a rude sword, which the old Indians have told me was once a common weapon; and I have seen the Eskimo in Lancaster Sound, &c., use a knife of a similar character.

If you wished further information about British-Columbian savage implements, you might obtain it from:—Dr. William F. Tolmie, Chief Factor of the Hudson's Bay Company, at Victoria, Vancouver's Island; Sir James Douglas, K.C.B.,

* See a memoir descriptive of "Mastodon Remains in the State of Missouri, together with Evidences of the existence of Man contemporaneously with the Mastodon, by Dr. Albert C. Koch," in the Transactions of the Academy of Science of St.-Louis, vol. i. p. 61 (1860). The same subject was noticed previously in the 'Philadelphia Presbyterian' Newspaper for January 12, 1839, and in the 'American Journal of Science and Arts,' vol. xxxvi. p. 198 (1839).—Edit.

Ex-Governor, Victoria; Mr. Joseph W. M'Kay, Hudson's Bay Company, Fort Yale, British Columbia; Mr. William Duncan, a Lay Missionary amongst the Chimseans, Metlakathla, British Columbia (through the Church Missionary Society); or from Mr. George Gibbs, Smithsonian Institute, Washington, District of Columbia, United States. I may possibly be writing to one or other of the two first-named gentlemen soon, and will mention the matter to them; but I do not think that you will find that they will be able to give a different answer from mine.

I forgot to say that I know of no Indian tribe which use or used a sceptre or insigne of office. For myself, if ever I can give you the slightest information or be of any use to you whatever, do not for a moment hesitate, as it will not only be a pleasure, but a small recompense for the benefit which I, in common with others, have derived from your researches. In the meantime believe me to be,

Dear Sir,

Yours very sincerely,

ROBERT BROWN.

Professor Rupert Jones, &c.

VI.

A BURIAL-PLACE OF THE CAVE-DWELLERS OF PÉRIGORD. By M. Louis Lartet.

Passing from Limoges to Agen by railway for the first time, and traversing the tortuous defiles of Périgord, we cannot but feel surprise and admiration on seeing the Vezère flow in the deep valley* whose freshness is in marked contrast with its bare and rocky escarpments. These picturesque cliffs, sharply limiting the river's course, and not unfrequently fantastic in shape, attract the traveller's attention, indifferent though he be, by a succession of unexpected and striking effects. Soon the eye becomes familiarized with the forms of the rocks, and we recognize a multitude of cavities in the cliffs. Some of them are natural; others have been carefully worked out by Man, and are sometimes even now used as portions of the rural habitations. The Romans, Normans, and English have succeeded one another in this little Perigordian Petra; and the chronicles of the Middle Ages comprise curious documents relative to the part played in the wars of those times by the Roc de Tayac, where we still find, cut in the limestone, rooms, galleries, and stables, constituting indeed a veritable castle (see page 4).

The Cave-dwellers, however, the oldest and strangest of all whom these rocks of Tayac have sheltered, were, without doubt, the Hunters of the Reindeer, who trod our soil when a crowd of strange animals existed here—such as the Mammoth, Lion, Reindeer, Musk Ox, Aurochs, and others, now extinct or completely driven from our climate. The Stations of these Hunters are numerous on the banks of the Vezère (pages 5 and 20); and the natural caves which served them for retreats, carefully explored by MM. H. Christy and E. Lartet, have of late years yielded up the secrets of their primitive industry and of their savage life. Little, however, has hitherto been determined as to their ethnic characters—and that only from unsatisfactory specimens, found in possibly abnormal positions. It was therefore with lively curiosity that, towards the end of last March, we were made acquainted with the discovery of some Human Skeletons in this district, under conditions which cannot fail to prove their high antiquity.

His Excellency M. Duruy, the Minister of Public Instruction, from whom studies of this kind receive high encouragement, being desirous of verifying the

* See the Maps at pages 19 and 29.

authenticity of this discovery, confided to me the scientific examination of the Cave; and of this mission the following are the principal results*.

The rocky cliffs out of which are hollowed the caves on the banks of the Vezère consist of the edges of the nearly horizontal strata of Cretaceous Limestones†, which the river and watercourses have deeply cut in excavating their beds. The faces of the cliffs present great parallel furrows or flutings, at several different levels and of great length. At first sight these chamfered lines seem attributable to the rapid and long-continued passage of strong currents much above the present level of the river; but on further examination we easily see that these parallel flutings have been produced by the incessant degradation of the soft, laminated, and therefore absorbent beds intercalated among harder strata, under the influence of atmospheric agents, particularly frost. This explanation, adopted by my father‡, has been developed with much sagacity by M. Alain Laganne§. Among the proofs which he has advanced, the most conclusive appears to me to be furnished by the fact that at certain places, where the inclination of the limestone bands have a direction different from that of the fall of the river-bed, the flutings follow the dip of the bands, thus showing their independence of the slope of the valley. To show this I give a sketch (fig. 37) of the arrangement of the chamfered lines along the rocks bordering the Vezère, to the right and left of the Roc de Tayac.

In accordance with the greater energy of atmospheric action there have been produced in these cliffs the flutings, the rock-shelters, and the true caves, in which the Reindeer-Hunters could find a refuge and a home.

* See also the preliminary notice, read before the Meeting of the Delegates of Scientific Societies, at the Sorbonne, April 16, 1868, by MM. Louis Lartet, Broca, Pruner-Bey, and Quatrefages; Mortillet's 'Matériaux pour l'Histoire de l'Homme,' vol. iv. p. 150.

Since authorizing the immediate publication of the discovery of the Cro-Magnon Cave and its contents in the 'Reliquiæ Aquitanicæ,' the Minister of Public Instruction has determined that all the Human Remains found in the Cave shall be deposited in the Anthropological Collection of the Museum of Natural History at Paris. His Excellency has also decided that painted casts of the Human Skulls and other important specimens shall be made, for distribution, together with the worked flints, shells, and other accompanying objects, to different Museums and Scientific Institutions. One series of these casts and specimens will be presented to the Christy Collection, and another to the Anthropological Society of London.

† See above, pages 3 and 33. ‡ See above, page 3.

§ See his "Note sur les érosions des Calcaires dénudés de la vallée de la Vézère et de ses affluents," in the 'Ann. d'Agric. Sc. et Arts de la Dordogne,' vol. xxix. pp. 192 &c., February 1868. Taking as a term of comparison the erosions effected since a well-determined date, M. Laganne has been able to calculate approximately that, in the natural process of chamfering, these flutings are deepened 15 millimètres (0·6 inch) in twenty years.

The accumulation of rubbish detached from the friable strata gives rise, at the foot of these scarped rocks, to the formation of a talus of comminuted débris, lying at the highest "angle of rest"; and these accumulations sometimes entirely mask the flutings and rock-shelters of lower levels. One of these latter, covered by a talus 4 mètres thick, has been found 880 mètres N.W. of the village of

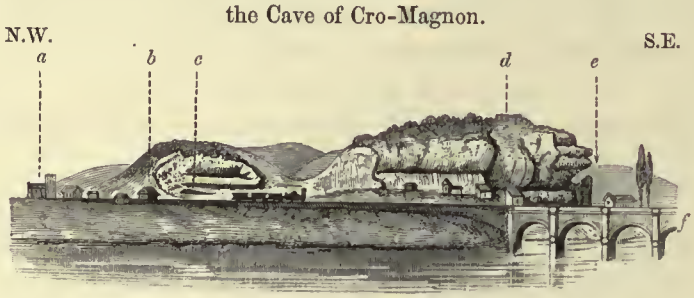
Fig. 37.

View of the Valley of the Vezère, showing the Chamfering or Fluting of the rocky face of the Right Bank, and the Inclination of these Lines in a direction contrary to that of the Slope of the River.

a, Les Eyzies.
b, Caves of Le Cingle.
c, Railway-bridge.
d, Roc de Tayac.
e, Gorge d'Enfer.
f, Laugerie Basse.
g, Tayac Church.
h, Les Eyzies Railway-station.
i, Place of the Rock of Cro-Magnon.

Fig. 38.

View of the rocks along the Left Bank of the Valley of the Vezère, from Tayac to Les Eyzies, including the Cave of Cro-Magnon.



a, Tayac Church.
b, Les Eyzies Railway-station.
c, Cro-Magnon Cave.
d, Rock of Les Eyzies.
e, Château of Les Eyzies.
f, Railway-bridge across the Vezère.

Les Eyzies, and 130 mètres S.E. of the Les Eyzies Railway-station, at a place called Cro-Magnon*, and at the foot of a rock the upper part of which stands up detached, roughly resembling a great mushroom. See figs. 38, 39, and 40.

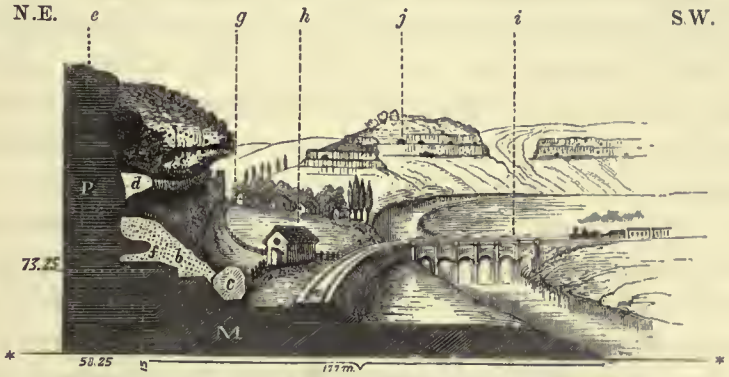
This newly discovered Shelter would perhaps have remained for ever unknown

* 'Cramagnon' on the Survey-Map.

if the construction of the Railway-embankment (fig. 39, *a*) close by had not occasioned the removal of a considerable portion of the talus (*b*), and of a gigantic

Fig. 39.

Section across the Valley of the Vezère, and through the Rock of Cro-Magnon.



* Level of the Vezère, at low water, 58·25 mètres above the sea.
Height of the Cave above the Vezère 15 mètres, above the sea-level 73·25 mètres.
Distance from the Cave to the River 177 mètres.

a, Railroad.
b, Talus.
c, Great Block of Stone.
d, Ledge of Rock.
P, Limestone.
M, Detritus of the Slopes, and Alluvium of the Valley.
e, Rock of Cro-Magnon.
f, Cave.
g, Château and Village of Les Eyzies, in the Valley of the Beune.
h, Gate-keeper's House.
i, Railway-bridge over the Vezère.
j, Caves of Le Cingle.

block (*c*), detached from the neighbouring rocks and measuring 311 cubic mètres, and afterwards the pulling down of a projecting ledge of rock (*d*) above the talus*.

Fig. 40.

View of the Cro-Magnon Cave, with the Pillar supporting the Roof.

a, The Road rising to the N.N.W. *b*, Les Eyzies.

* Thanks to M. de Nomaison, Railway-Engineer, at Périgueux, who kindly communicated the necessary documents, we have been able to give an exact account of the successive interferences with the natural form of the ground at this spot.

Lastly, towards the end of March, two Contractors at Les Eyzies, MM. Bertou-Meyrou and Delmarés, took away still more of the talus, as material for a road near by; and, after having removed 4 mètres of the débris covering the Shelter, the workmen, digging further beneath the projecting ledge which they had thus exposed, soon came upon broken bones, worked flints, and, lastly, human skulls, the antiquity and scientific importance of which the Contractors immediately recognized. With prudence and good feeling, such as are unfortunately too often wanting, but which all lovers of Palethnological Studies will be glad to hear of, the Contractors at once stopped the works, and hastened to write to M. Alain Laganne, whose affairs had taken him to Bordeaux. Returning to Les Eyzies, M. Laganne some days after exhumed, in the presence of MM. Galy and Simon, of Périgueux, two skulls and some other fragments of a human skeleton, as well as worked bones of Reindeer and many chipped flint implements. It was now that the Minister for Public Instruction sent me to Les Eyzies, where, having surmounted some unexpected difficulties, thanks to M. the Prefect of the Dordogne, and to the obliging concurrence of MM. the Mayor and the Curé of Tayac, I was soon able to proceed with a regular and systematic exhumation of the sepulture and its approaches.

First of all it was necessary to support the vault of the Shelter or Cave by a pillar; for a deep crack threatened its fall, or at least its giving way (see figs. 40, 41, and 42). In digging a hole for the base of this pillar (Y), we were able to determine the succession of four black beds of ashes, one on another, the lowest of which contained the stump of the tusk of an Elephant (figs. 41 and 42, *a*); and this, although damaged by the pickaxe, was of sufficient interest to induce the Rev. P. Sanna Solaro, present at the discovery, to help me in disengaging it from the matrix. The pillar having been set up, we methodically excavated the several beds, one by one; and thus determined very exactly their nature, relations, and contents. As, however, in these respects they present a perfect analogy among themselves, excepting that they increase in thickness from below upwards, I shall very briefly describe them in the order of their formation.

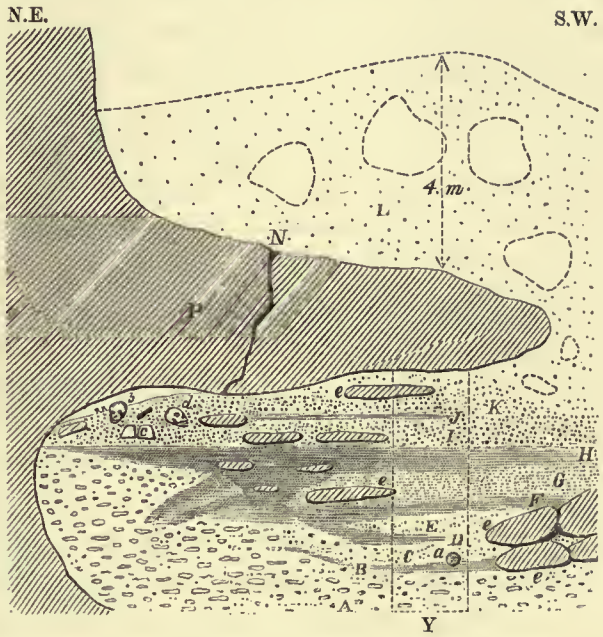
The Cave of Cro-Magnon is formed by a projecting ledge of Cretaceous Limestone* (rich with fossil Corals and Polyzoans), having a thickness of 8 mètres and a length of about 17 mètres (figs. 38, 39, 40, and 41, P). The bed which it overlies, and the destruction of which has given rise to the Cave, abounds with *Rhynchonella vespertilio*, which is a type fossil, fixing the geological horizon. The débris of this marly and micaceous limestone had accumulated on the original

* See also the Map, page 29, where this limestone is marked K 1.

floor of the cavern to a great thickness, at least for 0·70 mètre (see fig. 41, A), when the Hunters of the Reindeer stopped here for the first time, leaving as a trace of their short stay a blackish layer (fig. 41, B), from 0·05 to 0·15 mètre thick,

Fig. 41.

Detailed Section of the Cave of Cro-Magnon, near Les Eyzies. (The Section passes through the middle of the Cave, along the line α–β of the Plan, fig. 42.) Scale = $\frac{1}{100}$ (1 centimètre to 1 mètre).



A, Débris of the soft limestone.
B, First layer of ashes &c.
C, Calcareous débris.
D, Second layer of ashes &c.
E, Calcareous débris, reddened by fire under the next layer of ashes &c.
F, Third layer of ashes &c.
G, Red earth, with bones &c.
H, Thickest layer of ashes, bones, &c.
I, Yellowish earth, with bones, flints, &c.
J, Thin bed of hearth-stuff.
K, Calcareous débris.
L, Rubbish of the Talus.
N, Crack in the projecting ledge of rock.
P, Projecting shelf of hard limestone.
Y, Place of the pillar made to support the roof.
a, Tusk of an Elephant.
b, Bones of an old man.
c, Block of gneiss.
d, Human bones.
e, Slabs of stone fallen from the roof at different times.

containing worked flints, bits of charcoal, broken or calcined bones, and in its upper portion the Elephant-tusk before alluded to (figs. 41 and 42, *a*).

This first hearth is covered by a layer (C), 0·25 mètre thick, of calcareous débris, detached bit by bit from the roof, during the temporary disuse of the

Shelter. Then follows another thin layer of hearth-stuff (D), 0·10 mètre thick, also containing pieces of charcoal, bones, and worked flints. This bed is in its turn overlain by a layer of fallen limestone rubbish (E), 0·50 mètre thick. Lastly there is over these a series of more important layers, all of them containing, in different proportions, charcoal, bones (broken, burnt, and worked), worked flints (of different types, but chiefly Scrapers), flint cores, and pebbles of quartz, granite, &c. from the bed of the Vezère and bearing numerous marks of hammering. Altogether these layers seem to have reference to a period during which the cave was inhabited, if not continuously, at least at intervals so short as not to admit of intercalations of débris falling from the roof between the different hearth-layers which correspond with the successive phases of this (the third) period of habitation. The first (lowest) of these layers (F) is full of charcoal, and has a thickness of 0·20 mètre; it does not touch the back of the cave, but extends a little further than the earlier layers. At its line of contact with the calcareous débris beneath, the latter is strongly reddened by the action of fire.

On the last-mentioned hearth-layer is a bed of unctuous reddish earth (G), 0·30 mètre thick, containing similar objects, though in less quantities. Last in succession is a carbonaceous bed (H), the widest and thickest of all, having an average thickness of 0·30 mètre; at the edges it is only 0·10 mètre thick; but in the centre (X), where it cuts into the subjacent deposits, which were excavated by the inhabitants in making the principal hearth, it attains a depth of 0·60 mètre. This bed, being by far the richest in pieces of charcoal, in bones, pebbles of quartz, worked flints, flint cores, and bone implements, such as points or dart-heads, arrow-heads, &c., may be regarded as indicative of a far more prolonged habitation than the previous.

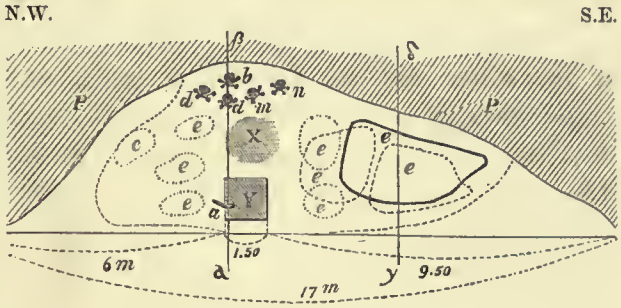
Above this thick hearth-layer is a bed of yellowish earth (I), rather argillaceous, also containing bones, flints, and implements of bone, as well as amulets or pendants. This appears to be limited upwards by a carbonaceous bed (J), very thin and of little extent, 0·05 mètre thick, which M. Laganne observed before my arrival, but of which only slight traces remained afterwards.

It was on the upper part of this yellow band (I), and at the back of the Cave, that the human skeletons and the accessories of the sepulture were met with; and all of them were found in the calcareous débris (K), except in a small space in the furthest hollow at the back of the Cave. This last deposit also contains some worked flints, mixed up with broken bones, and with some uninjured bones referable to small Rodents and to a peculiar kind of Fox.

Lastly, above these different layers, and all over the Shelter itself, lay the rubbish of the talus (4 to 6 mètres thick), sufficient in itself, according to what

Fig. 42.

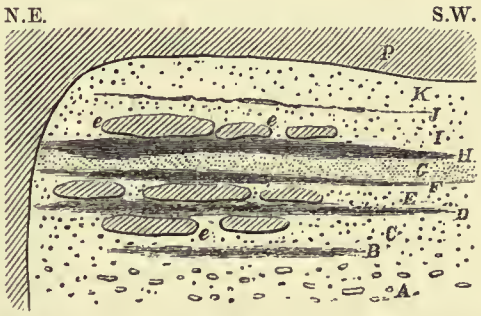
Plan of the Cave of Cro-Magnon, showing the Position of the Human Skeletons, of the Slabs, &c.



P, Limestone.
X, Central portion of layer H (fig. 41) where it was thickest.
Y, Base of the pillar built to support the roof.
a, Tusk of an Elephant.
b, Skull of an Old Man.
d, Human bones.
e, Slabs fallen from the roof at different times.
m, Bones of a Woman.
n, Human bones.
α–β, Line of the section shown in fig. 41.
δ–γ. Line of the section shown in fig. 43.

Fig. 43.

Section of a lateral portion of the Cave; along the line γ–δ of the Plan, fig. 42.
Scale = $\frac{1}{100}$ (1 centimètre to 1 mètre).



The Letters mean the same as in fig. 41, except that the bed J here contains no relics, and is stalagmitic and not carbonaceous.

we have said above about its mode of formation (p. 63), to carry back the date of the sepulture to a very distant period in the Prehistoric Age.

As for the human remains and the position they occupied in bed I, the following are the results of my careful inquiries in the matter. At the back

of the cave was found an old man's skull (*b*), which alone was on a level with the surface, in the cavity not filled up in the back of the cave, and was therefore exposed to the calcareous drip from the roof, as is shown by its having a stalagmitic coating on some parts. The other human bones, referable to four other skeletons, were found around the first, within a radius of about 1·50 mètre. Among these bones were found, on the left of the old man, the skeleton of a woman (fig. 42, *m*), whose skull presents in front a deep wound, made by a cutting instrument, but which did not kill her at once, as the bone has been partly repaired within; indeed our physicians think that she survived several weeks. By the side of the woman's skeleton was that of an infant which had not arrived at its full time of fœtal development. The other skeletons (figs. 41 and 42, *d*) seem to have been those of men.

Amidst the human remains lay a multitude of Marine Shells (about 300), each pierced with a hole, and nearly all belonging to the species *Littorina littorea* so common on our Atlantic coasts. Some other species, such as *Purpura lapillus*, *Turritella communis*, &c.*, occur, but in small numbers. These also are perforated, and, like the others, have been used for necklaces, bracelets, or other ornamental attire†. Not far from the skeletons, I found a pendant or amulet of ivory, oval, flat, and pierced with two holes. M. Laganne had already discovered a smaller specimen; and M. Ch. Grenier, Schoolmaster at Les Eyzies, has kindly given me another, quite similar, which he had received from one of his pupils. There were also found near the skeletons several perforated teeth, a large block of gneiss, split and presenting a large smoothed surface; also worked antlers of Reindeer, and chipped flints, of the same types as those found in the hearth-layers underneath.

This Sepulture occupied a very limited area; and we have met with no trace of it in a cutting along the line γ–δ of the Plan (fig. 42). This second section (fig. 43),

* M. Fisher, my Colleague in the Museum, has been so good as to assist me in these determinations.

† Should it be asked if the Reindeer-hunters of Périgord did not use these shells as money, as is at present the custom in the East and on the Coast of Guinea with the Cowries got from the Philippines and the Maldives, we have three reasons for not supposing that they did. 1st. The original place of the Shells is too near to the Stations of the Vezère. 2ndly. Though the *Littorina littorea* much predominates, yet there were found other oceanic shells with them, which could not answer to the conventional and specified type constituting this sort of money. 3rdly. In analogous Stations we find rare fossil shells similarly perforated, and probably intended to be hung from the neck, just like the amulets and pierced teeth frequently found in deposits of this kind.

Moreover, of what use would money have been to men who found in the animals with which the country abounded all the supplies required by their manner of life?

4 mètres away from the preceding, shows the same alternation and succession of the detrital and the carbonaceous layers. We here find, at the upper part of bed I, no trace of the thin upper hearth-layer; but its level seems to be indicated by a little bed (J), the constituent particles of which are more or less coated with stalagmite. This was probably the floor of the cave previously to its being definitely filled with the accumulated débris (K).

What this last section shows us as particularly remarkable are the great slabs (*e*), occurring at different levels, but principally above the carbonaceous layers. They have fallen from the roof of the cave at different times; and some of them were so large as to require gunpowder for their removal. Similar blocks, of less size, were scattered nearly throughout the Cavern, as shown by the sections and plan (figs. 41, 42, and 43); and they were notably accumulated in great numbers over-against the pillar (fig. 41) which we had to build, as above described (p. 66).

To resume:—The presence, at all levels, of the same kind of flint scrapers, as finely chipped as those of the Gorge d'Enfer, and of the same animals as in that classic Station, evidently shows them to be relics of the successive habitation of the Cro-Magnon Shelter by the same race of Nomadic Hunters, who at first could use it merely as a rendezvous, where they came to share the spoils of the chase taken in the neighbourhood; but coming again, they made a more permanent occupation, until their accumulated refuse and the débris gradually raised the floor of the cave, leaving the inconvenient height of only 1·20 mètre between it and the roof; and then they abandoned it by degrees, returning once more at last to conceal their dead there. No longer accessible, except perhaps to the Foxes above noticed, this Shelter and its strange Sepulture were slowly and completely hidden from sight by atmospheric degradation bringing down the earthy covering, which, by its thickness alone, proves the great antiquity of the burial in the cave.

The presence of the remains of an enormous Bear, of the Mammoth, of the great Cave-Lion, of the Reindeer, the Spermophile, &c. in the hearth-beds strengthens in every way this estimation of their antiquity; and this can be rendered more rigorously still if we base our argument on the predominance of the Horse here in comparison with the Reindeer, on the form of the worked flints and of the bone arrow- and dart-heads, and on the above-mentioned indications of hunting, as well as on the absence of any engraving or carving. Hence we may refer this Station of Cro-Magnon to the age immediately preceding that artistic period which saw in this country the first attempts of the Engraver and the Sculptor.

Whence came these ancient men of the Vezère? Here the Geologist must be

silent. His duty is to confirm the facts forming the subject of this Introductory Notice, as far as they belong to his domain. To the Anthropologist we look to enlighten us on the characters of the race. It may, however, be remarked that the sea-shells associated with the Sepulture at Cro-Magnon are in no wise of Mediterranean origin, but belong only to the Atlantic Ocean, and are notably common on the shores of La Charente. This fact may be taken in consideration together with the circumstance of there being in this Sepulture several pebbles of Basalt, which could not have been taken from the valley of the Vezère, but might well have been brought from that of the Dordogne. Hence we are led to suppose that before coming to the Cave District, where they found conditions so favourable for their mode of life, the Reindeer-hunters had sojourned on our Atlantic Coasts, and that they arrived at the banks of the Vezère after having ascended the Valley of the Dordogne.

VII.

AN ACCOUNT OF THE HUMAN BONES FOUND IN THE CAVE OF CRO-MAGNON IN DORDOGNE. By Dr. Pruner-Bey.

[C. Plates I.–VI.*]

Preliminary Notice.

Immediately on the discovery of this Cave it was rumoured that seven human skeletons had been found; but, with the most scrupulous care, only those of four adults and one immature infant have been recognized.

There are more or less perfect skulls, and some bones of the extremities, of three full-grown individuals, together with ribs, vertebræ, and fragments of a pelvis and of a collar-bone. Of a fourth individual there remain only some remains of the calvarium, half of the upper alveolar process, and a piece of the jaw. Judging from these fragments, this latter person appears to have been a female; and, since one of the above-mentioned crania is also that of a female, the four adults were two men and two women. Moreover there are some bones belonging to a fœtus.

As the bones differ in condition only with the matrix surrounding them, and as they were found at the same level, we may conclude that they were buried either at the same time or at short intervals. The small number of the bones leads us to suppose that we have here to do with a family burial-place; and this supposition is strengthened by the marked agreement of the cranial characters.

Among this collection of bones the skeleton of an old man, possibly the head of the family, has better resisted decomposition than the others, having been protected by a thin coating of stalagmite. Everything remaining of the other individuals is more or less imperfect.

Lastly, all these human bones, now carefully hardened by M. Stahl, presented, before being prepared, absolutely the same aspect and the same specific gravity (from want of gelatine &c.) as the bones of Reindeer and other animals with which they were associated.

I shall divide my Memoir on these osseous remains into two Parts,—the first being analytical, and the other synthetical. The First Part (Chapters I. and II.)

* The artist has produced reversed figures of the Skulls and Bones on these Plates.

will be purely descriptive, comprising an account of the skulls in the first Chapter, and of the other bones of the skeleton in the second. In the Second Part (Chapter III.), I shall endeavour, as far as I can, to indicate the race to which the Cave-dwellers of Périgord belonged, and what we may deduce, from their bony remains, as to their physical and moral qualities.

CHAPTER I.

DESCRIPTION OF THE CRANIA.

1. The Cranium of an Old Man: Skull No. 1. [C. Plates I., II., and C. Plate III. fig. 1.]

A. *General Condition of this Cranium.*

This cranium is very large and heavy. When struck it gives off a sound like a glazed earthenware bowl; and it is covered in front with a slight stalagmitic crust, which gives to that portion a granular or papillary aspect. A similar coating, though very slight, occurs also on the frontal region and the left temporal bones. The anterior part of the crown is covered with reddish plates, such as are observable also on the jaw, and are probably the result of an infiltration of oxide of iron; otherwise the bones of this cranium are dull white, and present a porous aspect. Very narrow fissures traverse the upper anterior part of the crown in different directions. We may especially direct attention to a spot a little off the median line, in the right* frontal region, measuring 35 millimètres in breadth and 29 in height, where the diploë is laid bare. The outer edge of this depression is thicker than the inner edge; and everything here leads us to suppose that the frontal bone was affected with caries during life. One word also on some linear markings which intersect each other on the posterior parietal region as though the bone had been scratched by the cutting edge of a flint: a similar appearance is observable on the second male cranium, and also on some femurs, where it was easy for us to establish the origin of these little depressions, which were clearly caused by the rootlets of plants. There is no sign that this cranium had undergone any rolling by water; and the same remark is applicable to the other bones.

The bones of the orbital and nasal cavities are wanting in this cranium, also a part of the left malar bones and of its zygomatic process; there is a defect at the base of the anterior border of the foramen magnum; and one of the two facets of the right condyle is wanting. The external pterygoid plates are also defective, and the palatine bone of the left side. The lower maxilla wants the left ramus and the right condyle.

Excepting a stump in the upper jaw, all the teeth are wanting. Nevertheless, for the most part, the sockets remain; they are deep, and everything indicates that the teeth were lost after interment; and indeed some roots recently broken are visible in the sockets. All the teeth, however, in this skull were not healthy; for in the jaw there is a fistulous hole communicating with the socket of the inner incisor. Moreover there are, on the same (left) side, between the last premolar and the first molar all the signs of caries; for the partitions of the sockets are absent, and we see smooth little projections of bone on the jaw below the sockets. Lastly some trace of caries shows itself in the upper molars.

* The reader will remember that all the figures are reversed on the Plates illustrating the human bones.

B. *Determination of the Sex and Age.*

The size, the development of the processes, the muscular depressions—in a word everything here indicates the male sex. The condition of the sutures and of the only remaining tooth, the aged projection of the chin, &c. show us that this man had passed his sixtieth year. Indeed, excepting the posterior portion of the sagittal suture, the squamous suture, the upper end and some small lateral traces of the lambdoid, and, lastly, excepting the spheno-temporal at the base of the skull, all the sutures are soldered up, leaving no trace. At the same time the left parietal foramen is still quite visible, though very small.

Is this almost complete obliteration of the cranial sutures to be attributed solely to the effect of age? We may doubt it, since in the normal state the soldering of the sagittal commences at its posterior third; whilst in this skull the progress of obliteration has been in the contrary direction.

Judging by a stump of the penultimate upper molar, this old man's teeth had been worn down to the crown. What is more, this stump is surrounded below with a plate of crushed enamel, which laterally laps over much of the root. The dentine and the canal are visible in the centre of the tooth.

C. *Morphology.*

This skull so stands on its mastoid processes and dentary arch that the sockets of the incisors remain in the air (C. Plate I. fig. 1). Seen from above (C. Plate II. fig. 1), it presents an oblong form, narrowing gradually towards the forehead. The crown is marked on the sides with the semicircular lines or temporal ridges, and on the top with the elevated ridge of the sagittal suture, where the parietals unite, almost like an ass's back. The gradual narrowing towards the median line of the summit is equally pronounced on the coronal suture, where a projection following the same line is neatly drawn above the frontal region.

In front view this skull has very decided characters. In general form the face has the lozenge-shape almost as well pronounced as in an Esquimaux skull; the latter, however, differs in all other particulars. If we establish a horizontal plane at the level of the lower edges of the malar bones, and follow at the sides of the face the line bordering the malo-orbital processes in their prolongation to the forehead, we shall have on each side a line strongly inclined inwards, meeting with that of the opposite side to form a triangle, the base of which is at the lower rim of the broad cheek-bones, and the point of intersection at the apex of the forehead. If we then adjust the lower jaw to the skull, and, again starting from the aforesaid plane, follow the contour downwards to the chin, we shall have a reversed triangle, and consequently a lozenge-form in the general outline (C. Plate I. fig. 1).

The anatomical details of the face combine, on the one hand, in producing this general form; and, on the other, they impress on the countenance its altogether peculiar stamp.

In the first place, the forehead is marked by very short supercilliary ridges, not very prominent, and uniting at the glabella, which however shows no particular prominence. A slight depression traverses the brow; and above this the forehead rises with a bumpy surface. This conformation of the forehead and brow is accompanied by a receding of the sides towards the temples, already commencing at the level of the orbital arches, and, at first very moderate, rapidly increasing as the lateral slope of the forehead approaches the crown. Hence the formation of the triangle of the frontal bone.

If then from the forehead we descend to the orbital region, we first recognize the great depth of the orbits and the convergence of their axes, and then their enormous transverse diameter. This conformation of the orbital opening is connected above with the excessive development of the external angular process of the frontal bone, which, large and directed outward, usurps the outer two-thirds of the orbital arch. On its side, to unite the lower with the upper orbital rim, the upper maxillary sends a broad process to the malar, high, not hollowed, and with its lower border turned laterally outwards, enlarging the base of

the two triangles before mentioned. The upper orbital border is thin and overhangs the lower, which is thick; and, lastly, the vertical diameter of the orbital opening is much less than the transverse. There was, then, a small eye, sunken in a flat orbit, giving rise to a sombre expression of face.

As for the nose,—here the frontal processes of the upper maxillary are somewhat curved inwards; the root of the nose is broad and deeply hollowed. The nostrils, under a blunt and upturned nose, are broad, opening out downwards and sideways. The spina nasalis has been apparently reduced since interment. Altogether, then, we have here a nose deviating, in spite of some prominence of its ridge, considerably from the Aryan type in its general characters. It was a nose widely open to the winds, as it were, to scent its prey.

In harmony with what precedes, the sockets of the incisors, flattened anteriorly, are suddenly directed forward—whence result a prognathism comparable to that of our existing savages, and a broad sensual mouth.

Lastly a pointed chin, rather square, and prominent from age, helps us to complete our sketch of the physiognomic features of this old skull.

Looking at the profile (C. Plate I. fig. 1), we recognize in this skull the retreating forehead and the lateral compression behind the orbital processes, and consequently the triangular form of the temporal fossa, which is short compared with the size of the skull. We also notice the strong zygomatic arches below, swollen out externally, with the upper border descending from in front backwards. The lower root of the zygoma continues backwards, as a sharp ridge, as far as the temporal plate. Below this ridge a wide and deep fossa separates off the mastoid process. The temples, flat and very wide in every direction, are bordered above by the semicircular lines, which, in their posterior moiety, encroach considerably on the crown, without, however, coming nearer together than 89 millimètres. Placed behind the auditory canal, the parietal eminence, though comprised within the semicircular lines, stands out from the skull on account of its size. Lastly, if the parietals come down a little below the semicircular lines vertically towards the temples, it is nearly the same with their descent towards the occiput, where their lateral surface bulges out, whilst their hinder portion is flattened. This disposition of the parietals produces, on the one hand, the square shape of the crown, and, on the other, it is the cause why the occiput retreats only below.

Seen from behind (C. Plate III. fig. 1), the cranium shows its great width at the parietal eminences, which are here very visible, its nearly pentagonal outline, and parietal flatness. The free portion of the occipital plate, broad and short, descends almost to the level of the posterior curve of the parietals; consequently there is no occipital protuberance.

At the base of the cranium (C. Plate II. fig. 2), the muscular portion of the occipital plate joins its upper portion at a right angle. The contour of the former approaches a semicircle rather than an ellipse. The occipital protuberance is scarcely indicated, though the superior curved line presents a somewhat prominent ridge. In other respects, except two slight lateral elevations, the surface is nearly horizontal and deeply hollowed for the attachment of muscles. The mastoid processes are of a rather uncommon thickness, rounded, conical, and laterally prominent, but rather short in comparison with their thickness. The digastric fossa is narrow and deep; and the postcondyloid fossa is also deep. The foramen magnum is damaged at its anterior edge; still we may say that it was elliptical, and, for the size of the skull, rather contracted than broad. This contraction is increased laterally by the prominence of the two-facetted condyles which project into the hollow. The level of the foramen passes a little above the roof of the palate. Two-thirds of the foramen lie behind the auditory passages, which are elliptically broad. The styloid process appears to have been very slender indeed. The glenoid cavities are deep, and short from side to side, leading us to suppose that the condyles of the lower jaw were conical. The basilar

portion of the occiput is narrow, flat, and hollow in the middle of its inner surface. The pterygoid processes of the sphenoid are greatly inclined; and the external much exceed the internal processes in width.

The form of the palato is remarkable by its slight depth, by the nearness of the dental series (the width between the molars being only 35 millims.), and by the extreme projection of the incisal region. Not less remarkable is the smallness of all the foramina giving passage to vessels and nerves, excepting that of the right jugular vein. Lastly, we may note a slight asymmetry of the nasal septum, and the great projection of the os petrosum into the cavity of the skull.

The lower jaw (Plate I.), left to itself, rests on the middle of its under edge, whilst the chin and the posterior angle are in the air. Excepting the ramus, its body is not large. The under edge is thick in the molar region, and thins away considerably at its posterior third, where the outer surface of the ramus is deeply hollowed for the attachment of the masticatory muscles. The ramus has a rather uncommon breadth; and its angle, rounded at the edge, is very slightly bent outwards. The coronoid process appears to have been short; the sigmoid notch is wide and rather shallow. The form of the dentary arc is triangular, and the length occupied by the teeth (measured inside) is 58 millims. (2·303 in.). The last molars are hidden behind the ramus. The incisors are much compressed laterally, as well as the canine, the alveolus of which projects. Judging from the sockets, the molars were large and of the normal size, the wisdom-tooth being smaller than the others and with two fangs. On the inner surface, the mylo-hyoidean attachments are very wide and deep, and the mental processes are very prominent. Altogether the lower jaw, like the temporal region, gives evidence of a powerful masticatory apparatus.

A slight want of symmetry in the chin (the left side predominating) corresponds with that of the nasal septum. The squareness of the chin is more evident on its inner than on its outer surface. Lastly, the length of the horizontal body of the jaw corresponds with the widening of the ramus.

Arrived at this stage of the physiognomical examination, I have to remark that the greatest height of the skull is at the point where the parietals begin to descend towards the occiput, and the greatest breadth is behind this point (that is, at the parietal eminences). As for the dimensions and the relative diameters, I must refer to the Table of Measurements annexed (page 90).

With regard to the sutures of the skull, we cannot form an absolute opinion from what remains. The small traces of the sagittal and of the lambdoid still visible present coarse but deep toothing; and there is a little Wormian bone in the sagittal suture. Lastly, I ought to remark that the thickness of the skull does not appear to be considerable.

2. The Cranium of an Adult Male: Skull No. 2. [C. Plate III. figs. 2 & 3; and C. Plate IV.]

This skull is imperfect, there remaining only a very incomplete calvarium (that is to say, the frontal, the parietals with the edge of the wing of the sphenoid, and a part of the occiput) and the arch of a lower jaw, without teeth, which appears to belong to this skull. These bones are well preserved, but have a reddish colour. The greatest thickness (at the occiput) is 7 millims. The sutures are still visible throughout. The coronal is nearly straight, and on the left side makes a recentrant angle in the parietal bone. This skull, then, belonged to an individual, if not young, at least still in the prime of life. As for its volume and shape, this skull is like the foregoing, except in some particulars which I proceed to point out.

The upper rim of the orbit is thick; the superciliary arches are more prominent and longer than in the old man's skull, but just as much united at the glabella. The subglabellar depression is therefore deeper. The forehead is swollen above, and the frontal eminences are but slightly indicated; the space between them is 61 millims. (2·402 in.). Moreover the lateral slope of the forehead towards the crown is well marked.

There is a depression of the parietals on the crown in their first third, behind the coronal suture; and therefore the elevation of the sagittal suture is there strongly marked; but it disappears in the posterior two-thirds of the parietals. This difference in relation to two other skulls belongs, without doubt, to the abnormal condition of the occiput, where a series of Wormian bones are intercalated at the lambdoid angle, a disposition favouring the transverse extension of the cranium, whilst in the others there is a lateral compression along the sagittal suture.

At the occiput the parietal flatness is wanting. Moreover, by an anomaly, which we meet with also sometimes in the cranium of other races, the occipital plate, being globular, is as it were detached from the parietals, being separated at the lambdoidal angle by four large Wormian bones, whilst others smaller occur in the lambdoidal suture. Lastly, the parietal eminences, prominent upwards and backwards, are still more pronounced than in the old man's cranium; and they are also unsymmetrical, the prominence on the right side being much greater than that on the left.

This cranium has its greatest width below the parietal eminences; but we must not forget that its having been filled with earth must have increased its original transverse diameter.

The body of the lower jaw, when at rest, takes the same position as the one last described, the chin rising in the air a little and the hinder portion altogether. Moreover this chin, with its rounded point, projects but very little, and is marked in front with a flattened ridge. The height of the chin is 31 millims., its thickness is 12 millims.; the height of the horizontal portion is 25, and its thickness 12 millims. This jaw presents no indication of prognathism. On its inner surface the mental processes are weak and the mylo-hyoidean furrows are broad and deep. No tooth remains in this jaw. The sockets show that the form and size of the teeth corresponded with those of the preceding specimen.

3. Female Skull, No. 3. [C. Plate V.]

In this specimen the calvarium is still more incomplete than the foregoing; but it has the advantage of still possessing the right side of the face with the anterior portion of the palate. The bones are dullish white in colour, and not more than 6 to 7 millims. in thickness.

Its relatively small size, the smallness of its processes and bony projections, the slightness of the muscular depressions, the conformation of the forehead, &c., leave no doubt of this skull having been that of a female. What remains of the calvarium and the face authorizes us moreover to regard it as belonging to one of the same race as those above described.

Excepting the coronal at the temple, all the sutures are open outwards; but within, excepting at the angle of the lambdoid and middle of the sagittal, all appear to have been closed up. They are more strongly toothed than in No. 2, but the toothing is not deep. Most of the molars have their tubercles worn; consequently this woman had passed her thirtieth year. We may remark that the first premolar had two fangs. Moreover the teeth that remain are sound, strong, and white, with very thick enamel.

This cranium, as shown by the longitudinal diameter, would be very much elongated, and even more dolichocephalic than those of the men; but it is impossible to determine its greater breadth, on account of the imperfect state of the parietals. The crown is oblong, with the sagittal suture more prominent than in the foregoing (No. 2).

The features of the face, allowing for sexual differences, correspond with those of No. 1. The forehead is smooth, even to the slight projection of the superciliary arches; it is straight in front, but slopes laterally. The frontal eminences are small; and are 60 millims. apart. The orbit is very large, with a square opening; and, as is usual in the female, it is higher than in Man: its lower rim is very thick. The lacrymal canal is almost wholly excavated in the maxillary. The nose was probably thicker than in the

man, and not so depressed at the root. The nostrils are very large and smooth at their lateral and inferior rim, as also in the man; and there is the same flatness of the anterior surface of the alveoli of the incisors; but the sockets are rather shallower, and there is less prognathism. The malar process of the maxillary is smooth, broad, and high, and but slightly turned out at its lower edge. There is the same shallowness of the palate as in the Old Man. From these details it results that the face of this skull is pyramidal in a high degree.

As the cranial cavity is open (C. Plate V. fig. 1), it shows the strong projection of the petrous bone within. Externally (fig. 2) we can see in profile the mastoid process, short and convex outwards, the digastric fossa larger than in the Old Man, the submastoid fossa also deep, but the temporal ridge, behind the zygomatic arch, less prominent and smoother.

Looking at the occiput, we observe the parietal eminences above, which are smaller than in the skulls of the men; and the parietal flattening is less visible than in No. 1.

In the skull No. 1 there are some alterations from disease; and in this female skull I have to notice an injury from violence. In the region of the right frontal eminence is a penetrating wound, which, inflicted during life, has cicatrized on its edges, as is plainly seen. This wound, traversing obliquely the right frontal eminence, has a narrow lozenge-shape; and one of the lance-heads of chipped flint found in the Cave perfectly fits it. Moreover, on the left side of the skull the two anterior thirds of the temporal region are wanting, and the remaining edges of the parietal and frontal have such an appearance as leaves us in doubt whether the present condition of this part of the skull is due to injury during life or to subsequent damage. This woman was killed, perhaps, whilst pregnant; for, as above noticed (pages 70 and 73), there were found, associated with the other human bones, fragments of a skull and some of the long bones of a fœtus.

4. Different Fragments belonging to the Skulls Nos. 2 and 4.

I proceed to mention first a small fragment of the occiput, which seems to have belonged to cranium No. 2, because the protuberance here projects much more than in the other two skulls and is much flattened. Below the occipital protuberance the muscular impressions are very deep, as in specimen No. 1 (see page 76).

All the other cranial fragments appear to me to have belonged to one skull. First, there are some pieces of the frontal and the parietals, with a thickness reaching 10 millims., contrary to what we have observed in the perfect skulls. These remains must, for another reason, have belonged to the skull of an individual of some age; for the coronal suture is almost wholly closed; so also the sagittal on its inner surface, and this suture, as in the other skulls, is somewhat raised on the external surface.

Next, the left side of an upper jaw is worth mentioning. This still retains the second premolar and the two foremost molars; these are very much worn on the crown. They are large, very white, and strongly enamelled. As in the female skull, No. 3, the first premolar had two fangs. The sockets of the teeth are short; and are less inclined, and the breadth of the nostrils less marked. The spina nasalis, damaged in the other specimens, is here well preserved; it is short, broad, and somewhat pointed. Lastly, the palatine vault is slightly hollow; it is expanded in front, arched along the median line, and marked with longitudinal crests near the alveolar border.

Lastly, a small piece of the right side of the lower jaw retains three molars. The first two are large, and worn in the same manner and to the same degree as those of the upper jaw. The wisdom-tooth, smaller than the others, is still retained in its socket in consequence of the anomalous growth of its fangs (very large and curved backward).

Altogether, excepting this last-mentioned anomaly and the two-fanged condition of the first upper pre-

molar, the fine and strong dentition of these individuals shows no deviation from what we see in other jaws of the prehistoric period.

[For tho measurements of the Skulls, see the Explanations of C. Plates I.–V.]

CHAPTER II.

BONES OF THE SKELETON.

1. Pelvis.

All that remains of pelves, attributable to four individuals, is very fragmentary. The best preserved, on account of the stalagmitic coating, is that of the Old Man.

a. *The Old Man's Pelvis.*

There are two coxal bones (ossa innominata), both imperfect at the ilium above and at the tuberosity of the ischium below. That of the right side is more complete than the other.

The principal characters are as follows. What strikes one at first sight is the great size in relation to that of the skull: indeed everything here has reference to the extent of the bony surfaces. As peculiarities I may notice:—the deep excavation of the ilium and the transparency of its fossa; the enormous expanse of the ilio-sacral articulation; the great breadth of tho ilio-pectineal eminence; the thickness of the symphysis and the prominence of the spine of tho pubes; the contraction upwards of tho ischiatic notch; and the large size of the acetabulum. Moreover tho anterior-inferior spine of the ilium is very high and flattened; the posterior spines are broad, thick, and convex. The horizontal axis of the acetabulum being directed rather more inwards than usual, the thighs must have been near together abovo and separated below. The ilium being imperfect at top, we cannot determino its inclination with the horizon. Nevertheless, judging from its lower two-thirds, its inclination must be less than what is found to be the case in the European or even in the Laplander.

As for the dimensions of the pelvic cavity, it is impossible to determine them from these fragments. We can here give only some measurements taken from separate bones. The acetabulum is 54 millimètres high, and 51 broad. The general height of the pelvis must have been 200 millims. or more, since what remains gives 150 millims. The thickness of the pubis is 24 millimètres; that of the ischiatic tuberosity above 31 millimètres; and the breadth of the body of the ischium is 84 millimètres.

But in spite of the size and massive structure of the pelvic bones, it would seem that the upper part of the pelvis was not very spacious, on account of the excessive amplitude of the ilio-sacral articulation, which has a breadth of 88 and a height of 81 millimètres, whilst the distance from the anterior edge of this articulation to the subcotyloid notch is only 74 millims. This may give an approximate idea of the narrowness of the upper part of the pelvis, especially if we add that the distance from the arch of the pubes to the front edge of the articulation above mentioned is 102 millimètres in a straight line.

Lastly, the curvature of the ilio-pectineal and pectineal eminences being slightly marked, the transverse diameter of the pelvis could not have attained the normal length, unless the sacrum had been exceptionally broad; and this we proceed to prove by the specimen next to be described.

b. *Sacrum.*

This specimen, belonging probably to a male in the vigour of life, wants its fifth vertebra. What particularly strikes us in this sacrum is its breadth. It is 122 millims. broad above, and 57 below at

the level of the foramina. The total height of the four vertebræ, in a straight line, is 102 millims. The body of the first vertebra has a breadth of 50 millims., and a depth of 30 millims. On the anterior face a little excavation is noticeable. On the posterior face the articular facet is very hollow, and is 59 millims. long and 33 wide; there is a deep fossa above and within this facet; and, lastly, the sacral crest is bifid at the fourth vertebra.

c. *Right Os Innominatum.*

This is less perfect than those of the Old Man, being defective above and below. This fragment, however, belonged evidently to the pelvis of a male, as is shown by its size, massive structure, &c. Nevertheless the iliac fossa is deep, and its wall thin; the anterior-inferior iliac spine is rather thicker than in that of the Old Man, but equally bent inwards as the latter. At the ilio-pectineal eminence the groove is flat and has a rather uncommon breadth (43 millims.). At the ilio-sacral articular surface the auricular facet is deeply excavated and notched; its height is 71 millimètres, whilst in the Old Man it is only 60 millims. The ischiatic notch is a little broader than in the latter; whilst the length from its anterior border to the spine is 60 millims. in both. The distance from the front edge of the ilio-sacral articulation to the subcotyloidal notch is here 81 millims.; the width of the body of the ischium is 70 millims.; the thickness of the ischiatic tuberosity is 26 millims. (it is directed vertically downwards); the height of the acetabulum is 55, its breadth 54 millims.; and, lastly, the total height of this fragment of coxal bone is 195 millims. The last measurement proves that the height of this pelvis much exceeded 200 millims.

Hitherto we have been examining the pelves of some males; we have now to study the remains of some female pelves.

d. *Right Os Innominatum.*

This fragment consists only of the acetabular cavity with the body of the ischium and its tuberosity. The height of the acetabulum is 55, its breadth 53 millims. The height of the ischium below this cavity is 66 millims., the breadth of its body is 65, and the thickness of its tuberosity 29 millims.

Compared with the preceding examples, the external ischiatic surface is here more excavated; the spine and the tuberosity are turned more outwards. Hence very probably this was the pelvis of a tall woman*.

e. *Right Os Innominatum.*

This consists of two fragments belonging to one pelvis. They are of manifold interest, and I shall therefore examine them in detail. First, there exists the portion corresponding to the piece "d" described above; but it is of much less size, as these measurements show. The height of the acetabulum (shallower and directed more forward) is 50 millimètres, its breadth the same; the height of the ischium is 54, its breadth 65, and the thickness of its tuberosity 23 millims. The anterior-inferior iliac spine is flattish, high, and directed inwards; the ilio-pectineal eminence is arched and rather thick. The inner face of the ischium is excavated; its spine and its tuberosity are directed outwards.

To this fragment belongs another, representing the supero-posterior portion of the ilium. Its excavation and its inclination are considerable, and therefore feminine. Of the posterior iliac spines, the superior is arched, the inferior flattened. The superior iliac crest has a fine curve. The ilio-sacral articular surface is squarish; its height is 57, its breadth 60 millims. What is of much interest, both the articular surface and the curve of the crest correspond exactly with those in a female pelvis, in my

* A parallel to this, belonging to a woman of the Finnish type, and of the Age of the Reindeer, is preserved in M. de Ferry's fine collection.

collection, belonging to an individual of the Mongoloid brachycephalic type and of small stature, of the Age of the Reindeer.

Lastly, there is the head of a femur, also small, which fits the acetabulum of the pelvis "e," and without doubt belongs to it. The circumference of this articular head is 140, its height 31½, and its breadth 42 millims.

To sum up:—Though the first three pelves agree as to their size and morphology, it is not so with the last, which appears to indicate, in every point, the presence of a woman of short stature. Are we to conclude that there was also a different cranial form? Possibly; but we must look to other facts to enable us to pronounce on this subject.

2. Lower Extremity.

a. *Femur.* [C. Plate VI. fig. 2.]

The two femurs which certainly belong to the Old Man are very remarkable. Wanting their ends, they are nevertheless evidently very massive, and also much curved from before backwards in the upper part; the linea aspera also, flattened on its free edge, has been excessively developed; for after the point where it rises from the body of the femur it projects to the extent of 16 millims. The lateral curvature is also more considerable than in other cases. After the upper third the shaft is compressed laterally; and, lastly, quite a lip here constitutes the posterior edge of the inner surface,—a peculiarity which occurs in all the femurs of these skeletons.

On the left femur there is below the outer surface a depression due to the loss of substance, either from injury or superficial caries. We may also remark that the linea aspera, in spite of its excessive development, disappears entirely at its lower end.

These bones without their ends have a length of 40 centimètres (15·74 inches); hence their total length must have been at least 50 centims. (19·685 inches). Taking in the linea aspera, the greatest width is 40 millims. (1·57 inch), though the thickness at the same point reaches only 28 millims. (1·1 inch). The circumference of the shaft is 11 centims. (4·33 inches) above, and 14 centims. (5·5 inches) below.

Another right femur, without its ends, and probably female, is less massive. The linea aspera, although very prominent, is less developed than in the foregoing specimens, and its lower end is well produced. The curvature forward is at the middle of the shaft, and the lateral curve is on the outside instead of being on the inside. The length of the shaft is 38 centims. (15·55 inches), and its thickness 25 centims. (9·84 inches); its circumference at top is 105 and below 125 millims. (5·315 in. and 4·921 in.).

There is also a fragment of a femoral shaft which must be feminine. It is laterally compressed; its linea aspera is less prominent and flatter than in the others. The antero-posterior curvature is at top, and the lateral curve outwards. The greatest width is 31, and the thickness 25 millims.

Lastly, a fragment of the shaft of a left thigh-bone consists of an upper third, much compressed laterally. Its circumference is 98 millimètres; at the same point in the foregoing the circumference is 98, and in that of the Old Man it is 106 millims.

Altogether there exist evidently fragments of thigh-bones belonging to four individuals; for the last three fragments do not correspond.

Of two lower ends of femurs, one of the left side belonged probably to a woman, and another, of the opposite side, to a man. On the former the crest of the linea aspera appears to be little developed, contrary to what is seen in the other. The breadth of the articulation is 74 millims. in the former, and at least 80 millims. in the latter, which has lost the inner face of the condyle. The circumference above the joint is 150 and 160 millims.

b. *Tibia.* [C. Plate VI. fig. 3.]

Of four tibias three are imperfect, and one whole. This latter corresponds with the but-end of the femur last described; and very probably these two bones and the Skull No. 2 belonged to the same man. This tibia, which is very massive and long, presents some peculiarities which are in correlation with those of the thigh-bones. First, its direction is oblique from within outwards; then, less prismatic and more compressed laterally than a normal tibia. This bone presents on its outer face a deep excavation marked by a very prominent ridge; this hollow has reference to the same feature observable in the only fibula obtained from the Cave. By the lateral compression the exterior surface is enlarged at the expense of the posterior, so that the breadth of the latter is reduced at one point to 21½ millims., whilst the antero-posterior diameter is 43 millimètres.

The length of the tibia is 380, the breadth of the articulation is 80, and the circumference above the joint is 150 millims.

The right tibia belonging to the skeleton of the Old Man is also compressed laterally above. The excavation on the outer surface is here rather shallower, and the ridge, marking it towards the posterior surface, is rather less prominent than in the foregoing case; but there are in this region papillary projections, which would appear, in part at least, to have been due to disease. The transverse diameter is reduced to 18 millims.; the antero-posterior is 47 millims.

Another lower end of a tibia of the right side presents no excavation on the outer face. There are, however, some papillary growths of bone observable above the fibular notch.

Lastly, another distal end, left side, smaller than the others, also shows the excavation on its outer face.

c. *Fibula.* [C. Plate VI. fig. 4.]

This bone, very much excavated, measures 385 millims. in length. Its greatest breadth is 18 millims. In place of being straight, it is slightly curved, like the bow of a violin.

d. *Bones of the Foot.*

A right calcaneum belongs without doubt to the skeleton of the Old Man. Compared with that of a man above middle height, it is larger in every direction, but notably in length. There is here one exceeding 7 millimètres in length, of which 4 go to the articular portion, and 3 to the talon. The superior articular surfaces are flatter, and therefore the groove is shallower. The two inner facets are united, and the upper one is longest. The lower surface is less excavated and flatter; and its two tuberosities are less prominent. On the internal surface the groove is very large; but the little process is less prominent.

Of two astragali, the left is larger than the right one; and the latter has the neck very short. If, then, the os calcis has an excess of length, the first of these astragali has an excess of breadth of 10 millims.

In two scaphoids the anterior articular surfaces are rather indistinct: the tubercle is very much rounded, and presents no facets for the cuboid.

The cuboid, also large in every sense, surpasses, in its length of 6 millims., the modern specimen which serves as a term of comparison.

In breadth the three cuneiforms also have an excess of 6 millims.

The first metatarsal has a papillary aspect on its upper surface. The articular pulley is flattened below and much elongated (as is also another specimen which is imperfect). The length of this bone has an excess of 5, and the breadth at the articulations of 2 millims.

There is a first phalange of the great toe; and its length surpasses by 2 millims., and the breadth of the articular tubercles by 3 to 4 millims. the specimen of comparison. Independently of the swelling of the articulations, the inferior articulation offers a rough surface.

Lastly, of other metatarsals, a third, two fourth, and one fifth are all that remains of the bones of the foot. The excess in their length is 11, 9, and 3 millims. The last metatarsal is deformed by the rugged state of its inferior articular extremity and by the swelling of its pyramidal process.

Having arrived at this stage of the inquiry respecting the bones of the lower extremities, I proceed to state the two orders of resulting facts. In the first place, we have determined that these bones are massive and that the foot was flat and long, compared with the length of the long bones; and this is itself in every case considerable. Then it follows from the form of the femurs, tibias, and fibula, and even from the condition of the metatarsals, that nearly every individual had been more or less subject to rickets, at least in a small degree*.

3. Upper Extremities.

a. *Shoulder-blade and Clavicle.*

Of the shoulder-blade there remains only one mutilated anterior extremity, with deep muscular impressions and a very flat glenoid cavity. The external edge is 16 millims. thick.

A sternal end of a clavicle is also imperfect. Its breadth is 20, and its thickness 10 millims. It is very smooth and flat; and its curvature does not seem to be great.

b. *Humerus.* [C. Plate VI. fig. 1.]

There are three complete specimens, well representing this bone. The longest belongs to the left side. In comparison with its length and the breadth of its ends, it is the thinnest and straightest. Its shaft is laterally compressed, instead of being rounded like the others. The triangular surface above the elbow is also very much broadened by flatness. Lastly, the impress of the muscles is feeble.

The second, also belonging to the left side, besides being shorter, is more massive, and more round in its shaft. The bicipital groove is here longer and deeper. The imprint of the deltoid, the groove of torsion, &c. are here so marked that, independently of the normal twist, the body of the bone appears to have been subjected to a curvature.

The third specimen belongs to the right side, and resembles the last described; only the bicipital groove has here rather less depth; but it has greater breadth, and the imprint of the deltoid has not left so prominent a ridge as in the last.

Lastly, a fragment of a distal extremity corresponds with the last two specimens.

[For the measurements of the Humeri, see Explanation of Plates, page 91.]

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* The tibias like sabre-blades (that is, laterally compressed, even much more than among these old people of Périgord) have had their day of glory (ephemeral enough, to speak the truth); for some would herein incontinently see a character of the race, and, what is more, some Simian feature. There is nothing, however, in these adventurous hypotheses. Almost at the same time that Mr. Busk and the lamented Falconer called public attention to similar tibias found in Caves of Gibraltar, M. Broca obtained a considerable number in a megalithic monument (Chamant), belonging to the Period of Polished Stone. They have also been found elsewhere in France. For my part, I have also met with such a one among bones from Algeria, of recent date. On the other hand, the examination of a skeleton affected by severe rickets satisfies me that this form of tibia belongs to this category of individuals; and this is further confirmed, as regards these aborigines of Périgord, by the condition of other bones of the lower extremities.

c. *The Ulna.*

There are five specimens of the upper articular end of the Ulna. One of these is very massive, curved from before backwards, very rough at the olecranon, and deeply marked by muscular impressions. The four others are less robust. They belonged to three different persons. One only is quite thin and delicate.

Two lower ends, corresponding, have the normal curvature.

Lastly, there is a very remarkable fragment of a shaft. Its anterior surface, instead of being smooth, is hollowed deeply by a groove; and its hinder face, though convex, is quite rough. Can these be traces of rickets?

d. *The Radius.*

Of this bone there are two upper extremities and two lower, differing in size. One of these two radiuses must have been at least 262, and the other 270 millims. in length. There is also a fragment of the body of the bone.

All these radius bones are large, but have nothing abnormal about them.

e. *The Hand.*

There are only some metacarpals and phalangeal bones. The former comprise the second, third, and fourth, and are in general longer, less excavated, and less curved on the lower face than the same bones in a modern specimen.

The first phalanges, corresponding with the metacarpals, are not only longer but in general broader in the body, though the articular cavities are shallower.

Hence the hand was broad, the fingers large and less used than in the modern races.

With data so fragmentary as the foregoing, it is impossible to determine the length of the upper extremities compared with the lower. My impression is that the arm, in its totality, was short in relation to the pelvic limb, and that the forearm was long relatively to the arm above the elbow.

4. The Vertebral Column and Ribs.

a. *Vertebræ.*

There remains a solitary atlas, belonging to the Old Man. It is large and strong; indeed the support of the upper and lower articular facet is enormous, and the inequalities where the annular ligament is attached present two knobs projecting into the cavity. The inferior articular surfaces also are very broad. The transverse processes are square instead of triangular. On the other hand, the cavity is narrowed in its anterior portion. The antero-posterior internal diameter is 30, and the transverse 26 millims. Externally the width from one transverse process to the other is 81 millims., and the antero-posterior diameter 49 millims.

To another and younger skeleton belong a set of from the third to the sixth cervical, with a length of 56 millims., and with 11 to 14 millims. for the height of the several vertebræ. The seventh, belonging to another individual, is 16 millims. high. The spinous process remains only on the third, where it is bifid. Within, the transverse diameter is 20 and the fore-and-aft measurement 15 millims., both for the third and the sixth of these cervical vertebræ.

To the same individual apparently belongs also another set of from the second to the ninth dorsal vertebræ, with a length of 160 millims. The backward curve is here well pronounced. In the seventh

dorsal, the transverse diameter is to the antero-posterior, in the inside, as 18 to 17 millims., though in the first dorsal belonging to another person these measurements are 17 millims. each. The width from one transverse process to another attains 60 millims.

Five lumbar vertebræ belonging to the Old Man have been fitted together. The bodies are very much depressed, the edges very prominent and sharp. Altogether they are 140 millims. long. The curvature in a contrary direction to that of the dorsals is also well marked. In the fifth lumbar the fore-and-aft diameter within is 27·15 millims. The transverse processes are lost in these specimens; but in a fifth lumbar belonging to another backbone the distance between the transverse processes is 94 millims.

Besides these, there are also some separate dorsal and lumbar vertebræ, which enable us to prove the existence here of four persons.

b. *Ribs.* [C. Plate III. figs. 4 and 5.]

Altogether there are fifteen fragmentary specimens. Eight of them alone permit us to presume that the thorax was rather convex than flat. There are, however, amongst them two ribs, one with a squarish, and the other with a rounded edge, which have a thickness of from 10 to 12 millims.; and two others, with a sharp edge, have a thickness of from 7 to 11 millims.; and this very probably is an anomaly dependent on rickets.

After all this description of details, we have to regret that the imperfection of the materials at command does not enable us to determine the stature of the individuals with precision. Everything, however, concurs in leading us to presume that they were tall, attaining a height of six feet if not more.

CHAPTER III.

Synthetical.

Judging from the zoological and industrial accompaniments of the Human Remains described in the preceding Chapters, this family must have subsisted by hunting and fishing, and by such natural products as Man without agriculture and domestic animals can obtain. As to the products of his industry, this man, living in a state of nature, is comparable with that of Aurignac, d'Arcy, &c.* He does not appear, however, to have attained such a degree of skill as was acquired later in the same neighbourhood and elsewhere, especially in an artistic point of view, by the men of the Reindeer Age properly so called.

As to his exterior, a heavy frame was managed by a powerful muscular apparatus, which has left its traces in the hollows and ridges of the bones. A robust, but flattish, foot bore the body, and was fitted for running by its elongated heel. Of a sombre aspect, with an imposing stature, and conscious

* It is very remarkable that the human bones found in these localities present no evidence of tall stature. On the contrary, we have proofs at hand that there were there at least some individuals of a really liliputian dwarfishness; and yet, judging from palæontological and archæological data, the epoch was the same.

of his strength, ignorant of moderating his passions by a cultivated *morale*, he could be violent, and turn against the weaker sex the weapon intended to kill his prey. Indeed, whether we regard the wound inflicted on the woman, described above (page 79), as the result of a family quarrel, or of a combat between hostile tribes, it must be noted that as yet nothing parallel has been found among the human remains dating from that distant period.

His ornament was in accordance with the grossness of his instinct. Like the lowest savages of today, this old hunter had perforated shells for adornment (see B. Plate XI. fig. 1). Nevertheless these shells could have scarcely been within his reach, since they are marine. To acquire them he must have gone afar, or he must have got them by exchange, or even have taken them by force. At this period the abundant collection of Periwinkle-shells represents probably quite as great a treasure as pearls and precious stones with us; but it is scarcely presumable that this was current money, as Cowries now are in Africa, but rather a bijou of imaginary value. Lastly, some polished plates of bone, which by their wedge-like shape resemble little polished and perforated axes of a later age, were perhaps intended to serve as pendants (see B. Plate XI. figs. 2–4). At least such was the use of these hatchets in the Period of Polished Stone, when necklaces were made of disks of bone, polished stone, &c., in preference to shells, thus showing a progress in skill and industry. We may remark, nevertheless, that in the Phœnix Park, near Dublin, there was found under a dolmen a necklace of shells (*Nerita* [*Littorina*] *littoralis*), although the associated objects seem to belong to the Age of Polished Stone*.

Although endowed with an uncommon vigour, yet this old Cave-dweller was affected with rickets in his infancy, and caries in his old age. The latter disease is visible on the skull and jaw of the Old Man (page 74). As for the rickets, the long bones of the lower extremities, some rib-bones, and even the processes of the phalanges, bear evident marks of this disease: was it living in caves that caused this? This may have been the case, since the Cave-dweller of Neanderthal and the Great Bear of the Caverns were also afflicted with rickets.

If the field opened to the imagination in recalling the social state of the ancient Perigordians is vast, it is not so as to the group and race to which he belonged. Here we have for our guidance the osteological characters, and notably those of the cranium. Moreover these characters agree in the majority of the individuals, of both sexes, whose bones have here been best preserved; and,

* See 'Descriptive Catalogue of the Antiquities of Stone, Earthen, and Vegetable Materials in the Museum of the Royal Irish Academy.' By W. R. Wilde, &c., 8vo, 1857, pp. 180–183.

further, they are such as to enable us to refer these skulls and skeletons to the race living in the Age of the Reindeer, properly so called, and made known to us by the discoveries of M. Dupont in Belgium, M. Brunn at Montauban, and particularly M. de Ferry in the Mâconnais.

I have shown elsewhere that all the crania of the Reindeer Age, which I have provisionally termed "Mongoloid," constitute a double series, of which one approaches the Lap and the other the Fin of our day.

Now, as we may prove by the foregoing descriptions and by the Plates C. I.–V., the Perigordian skulls belong evidently by their cranial and facial architecture to the category of the Mongoloid group. At the same time, they are far from being Laps; and they depart even in some particulars from the type of the Fin in the strict sense. Thus, the cranium of the Lap is decidedly brachycephalic and generally not voluminous: that of the Fin (Suomi) is ordinarily also brachycephalic, as we learn from Dr. J. B. Davis's 'Catalogue' and from the specimens in the Museum of the Jardin des Plantes in Paris; or it is in any case very slightly dolichocephalic when it departs from the rule, as we may presume from the average of the indicial number given by Retzius, which is 808. Consequently, though Mongoloid, these Perigordian skulls, remarkable for their volume and length, present incontestably something new to us, as compared with all those of the Age of the Reindeer which as yet we have been able to study. Indeed, if the cranium from Rosette, found by M. Dupont, is sufficiently voluminous (560 millims. in circumference) to serve in this respect as a term of comparison, it is on the other hand eminently brachycephalic. Then, the male Finnish skull from Bruniquel and the female from Solutré, both belonging to the Reindeer Age, are certainly less dolichocephalic than these skulls from Périgord; and they present, too, at least some shades of difference in the conformation of the orbits, the nose, and the maxillaries. Nevertheless in considering the Perigordian crania, such as they are, as dolichocephalic, as we see by the Table of Measurements (page 90), we are far from being able to establish the degree of this dolichocephalism; for the three calvaria are partly abnormal and partly defective. The most complete of them, namely No. 1 (page 75), is affected with premature synostosis. The second presents both an abnormal conformation of the occiput (increasing its longitudinal diameter), and a posthumous transverse distension. Lastly, the third, female, wants almost all the left parietal. Consequently it is impossible to define, with sufficient accuracy for the determination of race-character, the dolichocephalism of these individuals. But if these skulls are Mongoloid, but neither Finnish nor Lappish, to what type do they approach?

My answer to this can be only suggestive; for, as concerns the Ougrian peoples specifically, we have not at our command any Vogul, Tcheremiss, Syryain, Mordvine, Votyak, or Ostyak skulls; and I can compare the old skulls only with those modern specimens we have.

Passing in review the modern Mongoloid skulls that are in the Jardin des Plantes, I am struck with the analogy which the existing Esthonian cranium presents to that of the old Cave-folk. Among the four skulls from Esthonia, one is abnormal from premature synostosis. Of the three others, two are modern, and one, taken from a tomb at Reval, is older. Of these three normal skulls, two are male, and one female. Of the two former the cephalic index of the modern one is 835, and that of the ancient one is 779; in the female specimen it is as low as 718. This last is consequently dolichocephalic in a high degree, more so even than the Perigordian skulls. This first difficulty removed, we see what remains:—excepting the volume, everything that distinguishes the Esthonian from his Finnish brother, whether in general conformation, or in details, is found in the skulls from Périgord. My statements may be verified by those who have no Esthonian materials at command; for there is a very fully detailed description incorporated by the lamented Prichard in his 'Researches on the Physical History of Mankind.' Any one consequently may with advantage compare Hueck's plates and description* with ours, and form a judgment with a full knowledge of the case.

Altogether, what I wish to affirm is that the skull from Périgord much resembles the Esthonian; but it may well be identical with others of the high north, and of which we have as yet no knowledge. Thus, to cite one example, M. von Baer informs us that the Vogul skull is, in the main, dolichocephalic. So also, according to all travellers, the skulls of the Siberian peoples are very large in relation to the stature of the individuals; and indeed a Toungouse and a Ghiliak skull each gave me a measurement of 550 millimètres for their circumference. Lastly, an Esquimaux skull long held the place of honour, for its size, in Morton's collection.

Who would be bold enough to assert that the volume of the Perigordian skull is a faithful expression of the cranial type of a whole people? On the contrary, we have here evidently to do with a family, rather than with an entire tribe; and this character might be exceptional here as it is elsewhere. At all events let us wait for other facts to clear up the subject.

We must remark, however, that a cranial volume, as in the two men, of 580

* Dr. Alex. Hueck, 'Dissert. inaug. de Craniis Esthonum,' Dorpat, 1838.

millims. (horizontal circumference) rarely occurs now-a-days. Among modern specimens I know only a skull of a Croat (580 millims.) and one of a Yoloff Negro (575 millims.) which have such dimensions. It is otherwise with some ancient crania which I regard as Celtic; for here such a volume is not rare. Altogether, the volume of the Périgord skull by no means obliges us to refer it to any other than some of the existing races of the North. This opinion gains some weight when the cranial volume is contrasted with the stature, as far as we can judge from the extremities, pelvis, and vertebræ. At least, if we take the length of the femur among the old Périgord folk as 50 centimètres, we see at once that among modern races the length of the femur, even in some females, exceeds this; and yet their cranium is very far from attaining a circumference of 58 centims. On the other hand, the ancient Finnish female of Solutré, whose femur is 46 centims. long, and whose pelvis is really enormous, has a cranial circumference of 53 centims.; and this corresponds very nearly with that of the Perigordian. It may be asked, however, If the stature of this Cave-dweller approached 6 feet, how can he be classed among the Mongoloid peoples of the North, especially the Esthonians (who have at the present day a sorry constitution and dwarf stature, particularly near Dorpat, where they drag out a miserable existence in hard serfdom)? We must take into consideration the following circumstances, here briefly stated. First, such is the information given by two competent judges, MM. von Baer and Hueck. Secondly, further north, where they are in a better condition, the Esthonians have a finer size and aspect, as also the Fins, among whom there are some as tall as the Swedes, and whose average height is 5·7 English feet (J. B. Davis). Thirdly, we must remember, too, that the great stature which we are discussing occurs only in two men among the Perigordian Cave-folk, and that there is, among four persons, at least one female of low stature, as I have shown by the examination of the pelvis &c.

My anatomical review would be very defective without again alluding to the pelvis, a portion of the skeleton which, after the skull, is the next important characteristic of the races of men. That of the Old Man at Cro-Magnon, which is the most perfect, is remarkable for its massiveness, for the deep excavation of its iliac fossa, for the great extent of the ilio-sacral articulation, for the prominence of the spine of the pubis, &c.; in two others we noticed the considerable breadth of the ilio-pectineal eminence, the breadth and slight concavity of the sacrum,—all of which characters at one time I have noticed in the pelvis of a Lap, the only one I have of a northern race.

As for the characters of the hand and foot in the Périgord skeletons, there

is nothing incompatible with what we know as belonging to the northern races above mentioned.

On the whole, if I am not entirely deceived, this review of the anatomical details authorizes us to regard the Cave-dweller of Périgord as decidedly affiliated to the other Mongoloids of the Age of the Reindeer; and where the representative of the Lap and the Fin occurs, the Esthonian should rightfully come in. Such, besides, is still at the present day the geographical position of these peoples in the North of Europe. To all we have said on the massiveness of the bony structure, we may append the words of Linné—"Fennones corpore toroso."

Can we, in the last place, draw from other sources any indications of the origin of our Troglodytes? In other words, will history, archæology, or philology give us here a ray of light. History cannot be asked for the explanation of prehistoric facts; but Tacitus, in his inscriptive style, represents the Fins of his epoch as savages, in the hunting stage, and as having only bone points for their arrows, just as our Perigordians had; and thus much only we get from history with archæology. On the other hand, however, these people of prehistoric times might, on their part, throw an unexpected light on passages in the Scandinavian Sagas, where it is a question of dwarfs versed in sorcery, and giants terrific in their violence. As for the former, they may be readily accounted Laps; and as for the giants, they might be regarded as mythological beings; but, if among the primitive Fins there were men of such stature and bearing as our old men of Périgord, they might well have overawed even the Scandinavians.

Lastly, as to the data of philology, the skulls are mute enough; nevertheless the conformation of the bony palate leads us to conclude that, at least phonetically, the language of our Cave-dwellers was neither Aryan nor Semitic. In fact we find their peculiar palate, low and extending forwards, only in those modern races who have a weak phonology, and sweet at times; and such are the Finnish idioms.

Note.—Since this paper was delivered to the printer, other strong proofs have come into my hand with regard of the rachitical character of the malformations observed on the bones belonging to the Troglodyte of Cro-Magnon. Moreover the existence of a cranial type as truly Esthonian as the modern, during the Reindeer Period, is now a well-established fact. We owe these discoveries to MM. de Ferry and Arcelin, two eminent pioneers in the unknown territories of Prehistoric Man. For two years they have been hard at work in a burial-ground

belonging to the Reindeer Period, which was discovered by M. de Ferry at Solutré, near Mâcon; and already fifty tombs, dating from this remote time, have been explored. Amongst the human remains, which were all kindly submitted to my examination, there are skulls of the Lappish and Finnish types—some the same as those of Cro-Magnon, one very nearly resembling the skull of the Esquimaux at Behring's Strait, and one skull as truly Esthonian as any known to us from Dorpat or Reval; and, what is still more, all the bones of the skeleton belonging to this last skull bear the vestiges of rachitism in a manner which admits of no discussion.—J. E. Pruner-Bey, Paris, August 18, 1868.

VIII.

REMARKS ON THE FAUNA FOUND IN THE CAVE OF CRO-MAGNON. By M. Edouard Lartet.

This Fauna is represented both by the osseous remains found associated with the Sepulture in this Cave, and by those found in the layers of Hearth-stuff. See the description of the Cave and its contents, pages 62 *et seq.* This Fauna comprises fourteen or fifteen species of Mammals, and one Bird (represented by a single bone).

The Carnivora are represented among others by a Bear, of great size, of which a metatarsal and two phalanges have been found; but they do not present sufficiently well marked forms for accurate specification.

Another Carnivore, of great size, is referable to the genus *Felis*, and is represented by a portion of an upper jaw, containing the sockets of the upper penultimate and of the last or carnassial premolars. This fragment can be fairly identified with the same bone in *Felis spelæa.* There is also half of a canine tooth, which appears to have belonged to a somewhat smaller and younger individual. The fang of this canine is marked with two notches made by a very sharp cutting instrument.

There is also the lower jaw of a large *Canis*, not distinguishable from the existing Wolf. Some other specimens are referable to other species or varieties of *Canis*, of which one does not seem to differ from our common Fox; whilst the other, smaller in its proportions, presents some anatomical peculiarities which I have not been able to match in the many skulls of the Fox in the Museum of Natural History at Paris.

There was also found at this Sepulture the femur of a Spermophile, but of an undetermined species. Some years ago we found in the neighbouring Cave of Les Eyzies half of a lower jaw and some cervical vertebræ of a Spermophile, which Dr. Falconer regarded as closely approaching *Spermophilus erythrogenus*: it certainly differs from that found by M. Desnoyers in the Bone-breccia of Montmorency, which has been compared by some with *Sp. citillus*, and by others with *Sp. Richardsoni.*

Two other Rodents, of the genus *Lepus*, but of a different size, have left their remains at the entrance of the Cave.

In one of the layers of hearth-stuff was found a good portion of an Elephant's

tusk, which we naturally refer to *Elephas primigenius*. It had in great part exfoliated and separated into small fragments, so that with great trouble only a stump a few inches long could be dug out (see page 66). Mention has already been made (page 70) of the discovery, among the human skeletons, of ornaments or amulets of ivory, one of them in particular showing, by fracture, the peculiar mode of exfoliation due to change by time in Elephants' tusks.

The genus *Sus*, rare throughout the Stations of Périgord, is here represented only by two molars and a lower tusk similar to those of the present Wild Boar.

As for the Horse, its remains are the most numerous here at Cro-Magnon, where it must have constituted the chief article of food for the people of the period.

The remains of the Reindeer are much less abundant here than we have usually found to be the case in other caves in the Dordogne; and those of the Aurochs seem also to bear a like proportion.

Some teeth only of the Common Stag (*Cervus elaphus*) and of the Bouquetin (*Capra ibex*) have been found here. There are no relics of the Chamois, nor of the Musk-Ox, though probably the contemporary Cave-folk ate these animals at the Station of the Gorge d'Enfer, on the other side of the Vezère.

Lastly, a single bone of a Bird has been found in the Cro-Magnon Cave. It is a humerus of large size; but it has lost its two articular extremities by old fractures, so that it is only with considerable reserve that M. Alphonse Milne-Edwards states that he believes it to present an aspect referable to the Crane genus.

It is remarkable that the remains of Birds are much rarer at these Stations of high Palæolithic antiquity than in those presumed to be more recent where the Reindeer predominated: thus we have not found a single Bird-bone in the Caves of Moustier and the Gorge d'Enfer in Dordogne; nor have I found any remains of Birds in the Grotte des Fées in the Allier. At Aurignac in Haute Garonne there have been found but few Bird-bones; and MM. Bourgeois and Delaunay have mentioned a few only as occurring in the Grotte de la Chaise (Charente). Let us bear in mind that all the Stations above-mentioned are characterized archæologically by the presence of arrows of the same type as those of Aurignac—that is to say, with simple points, and not barbed as are those of Les Eyzies, La Madelaine, Bruniquel, Massat, &c., where remains of Birds abound.

There is also another peculiarity, still more striking and significant, if it be confirmed by-and-by by more extended observations—namely, that in the same Caves

or Stations of the former age, in Dordogne and other countries, we have not ourselves ever collected a single Fish-bone; and we know that remains of Fish are abundant at La Madelaine, in the Cave of Les Eyzies, and particularly in the Rock-shelter of Bruniquel. There was not, therefore, in the mode of living an absolute conformity between the people of these two periods, though inhabiting the same country, and in the neighbourhood of the river, rich probably with fish then as now. Could it be that the more ancient people had no good fishing-implements? Or, perhaps, were they in the habit of eating their fish raw on the banks of the river, whilst their descendants, or successors of a different race (?), preferred to take their fish to the Caves and Shelters where they cooked their other articles of food? Indeed some modern travellers tell us of existing savages living near the sea and yet ignorant of the means of obtaining fish therefrom as an article of food.

Before leaving the consideration of this Fauna of Cro-Magnon, I would remark that no trace has been met with of the Saïga Antelope. Indeed it is only in the Stations with barbed arrow-heads, and where the Reindeer predominates, that we have as yet observed remains of the Saïga. Perhaps some persons may be disposed to admit that the people using barbed arrows must have introduced the Saïga into Western Europe, as others have already supposed that the same race brought in the *domesticated* Reindeer and even the Horse*. According to some the Saïga is moreover as fit for domestication as the Reindeer.

In verifying, in the first place, the specific determination of the cores which I was led to refer to the Saïga, I only had the opportunity of studying, for comparison, a pair of horns, in the Museum of Natural History, which Professor Milne-Edwards courteously allowed me to have sawn through lengthwise, so as to show the structure of their bony cores. This examination removed all doubt as to the specific identity of the fossil horns from the Caves of France with those of the Saïga now living in Russia. For the comparison of the limb-bones, however, and also of the head and teeth, I was at a loss for material, as there was neither skull nor skeleton of this animal in the Museum, though afterwards the bones of a young one were procured. I have, however, through the kindness of the eminent Professor Brandt, of St. Petersburg, obtained an adult skull, together with bones of the front and hind limbs. By a careful comparison of

* See 'La Caverne Bize, et les espèces animales dont les débris y sont associés à ceux de l'homme,' par P. Gervais et Brinckmann; Montpellier, 1864; and Van Beneden, 'Rapport sur les collections polytechniques de l'université de Louvain,' 1868.

these with the remains of the Quaternary Ruminants, I am convinced that in the almost incalculable number of bones, from the Drift and the Caves of France, which during the last ten years have passed through my hands, there was not a fragment of a jaw, or detached teeth, or even a single fragment of a limb-bone referable to the Saïga, though I have met with horn-cores (always isolated) coming from six or seven different localities. In particular, a portion of the frontal bone still supporting the two bony horn-cores, has been obtained from the celebrated Cave of Chaffaut*, near Civray (Vienne), by M. Gaillard de la Dionnerie, Procureur Impérial at St. Pons (Hérault).

How, then, can we account for the frequent occurrence of the horns of the Saïga in the Caves of Central and Southern France, and of no other portion whatever of this animal's skeleton, except by supposing that the long, solid, and pointed horns of the Saïga constituted a formidable weapon, which the Reindeer-Hunters of Périgord probably obtained, by barter or commerce of some sort, from the people with whom this Antelope was indigenous?

However that may be, I take this occasion to point out to those palæontologists who have not the skeleton or skull of the Saïga a distinctive and very important character in its dentition. In the skull sent me by Professor Brandt, which appears to be adult and quite normal, there are in the lower jaw, on either side, only two premolars and three true molars (altogether five grinders in each ramus); and this appears to me to be a deviation from the dentary formula of Ruminants, excepting the Camel of Asia and the Llama of America.

* In this Cave M. de la Dionnerie has found barbed arrow-heads, numerous implements, a complete necklace of the canine teeth of the Stag, and an engraved stone bearing two rows of Horses at a gallop. From this cave also, then known as the Cave of Savigné, were obtained the barbed weapon-head, and the two engraved figures of animals on bone, which I published in 1861, in the 'Annales des Sciences Naturelles,' 4me série, vol. xv. pl. 13. figs. 1 and 2.

IX.

ON THE HUMAN SKULLS AND BONES FOUND IN THE CAVE OF CRO-MAGNON, NEAR LES EYZIES. By Professor Paul Broca, General Secretary of the Anthropological Society of Paris.

Contents.

[*Note.*—In the following descriptions the numbering of the Skulls is different from that in M. Pruner-Bey's Memoir (see above, pages 73–92, and pages 89–91). "No. 1" is the same in both. "No. 2" in this Memoir corresponds with M. Pruner-Bey's "No. 3;" and "No. 3" with his "No. 2." M. Broca has adopted the numbers attached to these Skulls in the Museum of Natural History at Paris.]

§ I. Preliminary Remarks.

No discovery could be of greater interest to Anthropologists than that of these bones. It is the complement, I may say the crowning, of the important discoveries made by M. Edouard Lartet and his lamented collaborator Henry Christy in the Caves of Périgord, especially in that of Les Eyzies. The objects found in these Caves not only furnished us with the most satisfactory proofs of the contemporaneity of Man and the Mammoth, but they revealed the most curious details of the life and manners of the old Cave-dwellers of Périgord; still we were without any knowledge of the anatomical characters of this intelligent and artistic race, whose clever carvings are objects of our astonishment.

The excavations lately made near Les Eyzies, by M. Louis Lartet, enable us to supply this want; and there cannot be any doubt of the authenticity and high

antiquity of the human bones there exhumed. The stratigraphical details of the contents of the Cro-Magnon Cave, furnished by M. Louis Lartet (see above, pages 62–72), prove that the human bones are not only as old as, but even perhaps older than the carved objects from the great Les-Eyzies Cave. The latter correspond with the Period when the Reindeer predominated in the Fauna; whilst the former belong rather to the Period of the Mammoth; and though a considerable time must have elapsed between the two periods, yet there is nothing to hinder the belief of the gradual passage from one to the other, without any ethnic revolution, the same race maintaining itself in the same district uninterruptedly; so that, if the bones from Cro-Magnon are not those of the artists of the Reindeer Period, they are at least those of the ancestors of that people.

The remains of the Men of the Quaternary Period that we have hitherto been able to study belonged, for the most part, to individuals of short stature, with a rather small cranium, and a more or less prognathous face. Hence it has been concluded that the primitive population of Europe belonged to a Negroid race, according to some, and according to others to a Mongoloid race, whose stature did not much exceed that of the modern Laps. The facts on which this opinion rests I take as exact; but it rests also on a preconceived idea, which, for my part, I have long combated—namely, that in Quaternary Europe there was only one race of Men. Starting with the ethnogenic theory, that the diversity of the Human Race is produced by the influence of time and circumstances, the holders of the above-mentioned opinion admit that the typical differences ought to be less and less as we look back to past ages; and when the Polygenists object that the separation of the principal groups of races was already complete in the earliest historical times, they are told that it was not in those times, so close to our own, but in the immense and incalculable preceding periods that the divergences from the original type were manifested. Reduced to these terms, the question of the Unity of the Human Race is adjourned to the time when Palæontology shall have discovered the remains of Primitive Man, or at least relics of the races of the Quaternary Epoch. The Monogenists suppose that these races, separated from us by thousands of ages perhaps, and for certain infinitely nearer to original Man than the most ancient of the historic races, ought to present, if not an absolute uniformity, at least a manifest convergence towards the type of the common mould whence, they believe, all the races came.

It comes to this, however, (and it is usually the case,) that facts begin to contradict a preconceived hypothesis. The Quaternary race of Dordogne (Cro-Magnon) differs from the Quaternary race of the Belgian Caves, as much at least

as dissimilar modern races differ one from another. The contrast is complete, not only when we look at the conformation and volume of the head, but also if we look at the form and dimensions of the bones of the limbs.

§ II. Remarks on the Ages and Sexes of the three Individuals, and the General Characters of the Cro-Magnon Race.

The greater part of the Human Bones found at Cro-Magnon belonged to three individuals. There are three skulls, one of which is perfect. No one skeleton is complete; but the bones of the trunk and the limbs, classed according to their form, colour, and density, fall into three groups, which, according to the same characters, correspond to the three skulls respectively. There are also some small fragments of an adult cranium, and others of an infant's cranium. The number of bodies laid in this Cave was therefore not less than five; and everything goes to prove there were no more. It is therefore not impossible that all these individuals belonged to the same family.

We need here treat of only three of these, the others being represented by only very insignificant remains.

§ 1. *Individual* "No. 1."—This skeleton, the skull* of which is complete excepting a part of the lower jaw, is that of an old man. The bones of the face are incrusted with stalagmite. All the sutures were closed long before death. The lambdoid suture is still visible; but the coronal is entirely effaced, as well as the anterior portion of the sagittal. It results that the exact determination of the bregma is impossible; but I think that I recognize a trace of it†. In spite of the advanced age of this old man, nearly all the teeth were still in place at the time of death; they have fallen out since, and have not been discovered; the inner fang of the second right molar alone remains. In consequence of the crown of this grinder having been almost completely worn away by use, the remaining fang had been separated from the two others, which have fallen out. The flat top of this old worn fang is oblique from below upwards and from without inwards. It is an indication of old age, the other teeth also having necessarily been well worn.

The loss of the teeth has been posthumous, because the sockets have not cicatrized; but it took place before the incrustation, for this extends into the sockets. Everything, indeed, leads us to believe that this old man's teeth were not firmly fixed; for the sockets are wide and shallow, some evidently wider than the fangs, a condition common when teeth have been reduced to stumps, particularly in old people, and not at all referable to the presence of caries in the teeth or in the alveolar process.

To the skull No. 1 corresponds the group of the largest of all the bones found. We refer in particular to two thigh-bones, a tibia, and several ribs of extraordinary thickness. One of the femurs presents at its lower portion, immediately above the condyles, a shallow, well-defined depression, very old and evidently pathologic, resulting from a blow of a very hard body, forcing the compact outer plate into the spongy interior, without breaking the whole bone. I see reason to believe that this injury was caused by a smooth projectile, thrown perhaps by a sling; for our spent bullets sometimes produce similar injuries. The blow of a horn or antler, or of an Elephant's tusk, might probably have produced the same effect.

§ 2. *The Skull* "No. 2."—This belonged to a female, whose age I suppose to have been only from thirty-five to forty years, although the ossification of the sutures was far advanced. The bones of the cranial vault

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* On the lower part of the frontal bone, on the right side, is a large superficial erosion, which does not appear to me to present the characters of a pathological lesion, but seems to have been produced, after death, by physical causes in the cave.

† This I have marked with pencil on the skull; but I may be in error as much as 2 or 3 millimètres.

are entirely coalesced on their inner face. On the exterior the coronal suture is partly effaced; the sagittal and especially the lambdoid are much more apparent. Consequently the obliteration of the sutures advanced from before backwards. A similar state of the sutures in skulls of modern Europeans would indicate on an average an age of more than fifty years; but we know that among uncivilized races the sutures become obliterated at a much earlier period of life than with us. It is possible, then, that this woman was less than fifty years of age; and the state of her teeth supports this view. Only two teeth, the first and second right large molars, remain in place. The other teeth are gone; but the condition of the sockets proves that the teeth were displaced after death. The two remaining molars have been worn,—one very much, so that its cusps and furrows have disappeared and the ivory has been laid bare; the other has lost its cusps, but the bases of the furrows are still visible, and its enamel is nowhere worn through. As the first large molar cuts the gum at about the sixth or seventh year, and the second not until from the twelfth to the fourteenth, it follows that the first will be more used than the second, with the difference of from six to eight years. The amount of difference existing between the two molars under notice is such as would be referable to eight years' use; it is very considerable, and indicates a very rapid wearing of the teeth—either because the person habitually fed on very hard substances, or because the dental tissues were relatively soft. Moreover the wearing away of the second molar is very slight, compared with that of the first; and hence we may regard it as probable that a very long time had not elapsed between the cutting of that tooth and the woman's death. It seems to me impossible that she lived to the age of fifty years, as the advanced stage of the obliteration of the sutures would seem to indicate. I am indeed disposed to think that she was still young, not more than thirty-five or forty—an age at which in Negroes I have many times seen the sutures of the cranial vault almost entirely closed.

The direction of the plane of wearing cannot be determined on the second molar, which was not sufficiently ground down; but on the first molar it is oblique from below upwards and from without inwards. This is the same as is observed in the tooth of the "Old Man" No. 1.

The cranium of our "No. 2" is imperfect, especially behind and on the left side. Although incomplete, the face may be studied in its principal features. The left half of the frontal bone is penetrated, above the outer half of the orbit, by an oblique hole 33 millimètres (1·299 inch) long, 12 (0·472 inch) wide in the middle, and narrowing to sharp angles at the end, therefore in all probability made by a blow with a small stone axe. It was certainly made during life, and probably produced death, but not immediately; for we perceive on the inner face of the frontal, around the hole, a vascularity of the bone and a deposit of finely porous bony matter, which must have required from fifteen to twenty days for its production. The little fragment of bone, probably driven into the brain, has not been found; and there is no splintering of the table of the skull, the aperture in which has nearly as sharp an edge as that outside. Hence the blow must have been given with very great force.

As we have already seen that one of the Old Man's thigh-bones presents some traces of an old wound, received possibly in a fight, the Cro-Magnon people appear to us as of violent habits; and indeed, if the "Old Man" was wounded in the chase, the woman's wound was evidently given by a murderer.

The bones corresponding in colour with the cranium "No. 2" are large and strong, but less rough and massive than those of "No. 1;" and they otherwise present the characters of the bones of a female.

§ 3. *Skeleton* "No. 3."—"No. 3" was an adult man, about forty-five years old. The face and the temporal bones are wanting. All the occipital sutures, including those of six rather large wormian bones in the lambdoid suture, are still quite open. The sagittal is not at all closed externally, but it is closed on the inside. The coronal has quite coalesced on the inside; but on the outside, though the obliteration is much advanced throughout, there are still traces of the suture.

It is evident that the sutural obliteration has proceeded from front to back; having begun with the coronal, it next affected the sagittal, and had not time to influence the lambdoid. Comparing this condition with that of the two former skulls (in which also we saw the anterior sutures more obliterated than the posterior), we recognize among the Cro-Magnon people, as among the lower races of the present day, the ordinary obliteration of the sutures from before backwards.

I believe we may associate with this skull "No. 3" a detached fragment, consisting of the alveolar arcade and the palatine process of the left upper maxillary bone. Three teeth are still implanted in it—namely, the second premolar, and the first and second molars. All have been much used, particularly the first molar. As in the other cases, these teeth are worn from below upwards and from without inwards.

The group of bones of the trunk and limbs, which we believe to belong to the skeleton "No. 3," are not so well characterized as are the other two groups, the colour and density of the bones being less uniform. It is possible that some may belong to a fourth, and even to a fifth skeleton; the fragment of jaw, however, seems to me to belong to "No. 3."

In accordance with the foregoing explanations, we shall designate "No. 1" as "The Old Man," "No. 2" as "The Woman," and "No. 3" as "The Adult Man."

§ III. Remarks on the three Individuals above described.

§ 1. *General Remarks.*

These three individuals, though necessarily presenting notable differences among themselves, possess very many features of resemblance, which clearly establish their affinity, and characterize them as a particular race, different from all others at present known. They were of lofty stature; their bones are robust; their tibias are flattened transversely; their femurs present immediately below the region of the trochanters a somewhat irregular curve; their *cubiti* have a relatively shallow sigmoid hollow, and present at the top below the coronoid process a manifest concavity facing forward. Their pelvis is very broad. Lastly, the skull is very large, and markedly dolichocephalic. This dolichocephalism is not due to narrowness of the cranium (the breadth of which, on the contrary, is considerable), but to its great length. The orbital arches of the men are very much developed; the root of the nose is very much depressed; the forehead is broad, vertical, and convex, particularly on its median line; the temporal regions are not prominent; the greatest breadth of the skull corresponds with a line near the level of the parietal prominences, much above the level of the auricular regions; and the profile of the skull gives the form of an elongated ellipse, of which the anterior or frontal extremity is well developed, whilst its posterior or occipital end is still more broadly convex.

These characters are common to all the three individuals. As "No. 3" wants the bones of the face we cannot carry the parallel further, the more so as "Nos. 1" and "2" are of different sexes, and the face, as far as we know, always presents marked sexual differences. We may say at all events that in these two subjects the face is orthognathic from the root of the nose to the *spina nasi*—that below this spine there is an alveolar prognathism, much more strongly pronounced in the man than in the woman—that the orbits are very wide and very little developed in height—and, lastly, that the face altogether is very broad in relation to its height.

§ 2. *The Stature; the Limbs; the Trunk generally studied; and the Hypothesis of Rachitical Condition discussed.*

§ a. *The Stature.*—The stature was incontestably much greater than ours; and this is seen by a glance at the tibias and femurs. It is impossible to determine correctly the stature of any imperfect and disarticulated

skeleton; it is not even safe to apply to this determination the relationship between the length of the femur and the height of the body that medical jurisprudence has adopted; for these relations have been determined for men of our own race, and we know that the proportions of the body notably vary among existing races; and there is more reason why they may have varied among races who died out in the course of ages. On the other hand, the femurs from Cro-Magnon are imperfect, having lost their two extremities; but the shafts are so well developed in length and in breadth that they indicate a high stature and powerful frame. For example, the shaft of one of the Old Man's femora measures 394 millims.; and accurately matching the two ends of this shaft with those of the shaft of a complete femur, altogether 453 millims. long, I find that the part of the latter femur corresponding to the fragment from the Cave would be only 354 millims. instead of 394 millims. long; the Cro-Magnon femur therefore was at least 4 centims. longer than the one with which I compared it; that is to say, it was at least 493 millims. (19·410 inches) in total length. This minimum is got by supposing that the epiphysial ends were exactly of the same length on each of the two femurs under comparison—which indeed is in nowise probable, for it is certain that the extremities of the longer shaft were the more developed. If we suppose that the proportional length of the shaft to that of the whole femur was the same in the two cases, we shall have a total length of 504 millims. (19·843 inches) for the femur from Cro-Magnon. Doubtless the 493 millims. is much less than the reality. Now the Tables of relative size as prepared by Jurisprudents show that a femur of 49 centims. corresponds to at least a stature of 1·80 mètre. We may conclude, then, for certain that the Old Man of Cro-Magnon (allowance being made for the unknown diminution due to the effect of old age on the vertebral column) was more than 1·80 mètre (5 feet 11 inches) in height. This stature is exceptional at present among the European Races, and for the most part in other races; but it was not so among these old folk of Cro-Magnon, for the stature of the Man "No. 3," and even that of the Woman "No. 2," was little less. This race, then, was very tall; and this feature is still more worthy of attention since the long bones found in the Caves of Belgium indicate, for the Quaternary Men of that region, a stature below what is common now.

§ b. *The Femurs.*—The thigh-bones of our Old Man, remarkable as they are for their length, are not less noticeable for their breadth and thickness. At the middle portion, at the narrowest point, the shaft is 32 millims. broad and 39 millims. thick. I have compared these measurements with some I have taken of the same region in thirty-three femurs in our Museum from the ossuary of St.-Jean-de-Luz. None of these have attained the volume of the thigh-bones of the Old Man of Cro-Magnon, as shown by the following Table:—

		Dimensions of the Shaft of the Femur.	
		Breadth. millims.	Thickness. millims.
Femurs of the Old Man		32	39
Thirty-three Femurs from Saint-Jean-de-Luz.	Maximum	31	38
	Minimum	23	22
	Mean	26·51	27·79

None of these modern thigh-bones, we see, equal those from Cro-Magnon in breadth and thickness; but the difference becomes still more striking, if we consider them one by one. Thus, for the thickness, there is in the modern series a femur 38 millims. thick, a second is but 35 millims., and a third is only 32 millims. thick; the others are below 32 millims. There is, then, but one of these modern femurs which approaches the old femurs in breadth, and one in thickness; and the two maxima (in breadth and thickness) are not in the same bone (the femur 38 millims. thick is only 29 millims. broad; and the femur 31 millims. broad is only 35 millims. thick); so that if, to get an idea of the volume of the shafts we multiply the breadth by

the thickness, we find, for the two largest of these modern femurs, the products 1102 and 1085; whilst for the old femurs we have the product 1248, greater than the others by 13 and 15 *per cent.*

The femurs from Cro-Magnon, broader than all the human femurs with which I have compared them, approach in this character the femurs of the anthropomorphous Apes. The femur of the Chimpanzee in the Orfila Museum is 34 millims. broad; and that of the Gorilla in the same Museum is 42 millims. In other respects, however, the femurs from Cro-Magnon differ essentially from those of the great Apes, since that of the Chimpanzee is only 27 millims. thick, and that of the Gorilla is 31 millims. The femurs of Apes, then, are broader than thick; whilst those from Cro-Magnon are much thicker than broad. The differences of length are, of course, greater still; for, as is well known, the thigh-bones of the anthropomorphic Apes are, absolutely and relatively, much shorter than those of Man.

The most striking character of the femurs from Cro-Magnon is furnished by the *linea aspera*, which is here unusually broad and thick*. The lines of muscular insertion are more strongly pronounced than I have ever seen them. In the anthropomorphous Apes the *linea aspera* is always much less prominent than in Man; indeed it is sometimes wanting in them; the conformation, therefore, of the femurs from Cro-Magnon is quite opposed to that of Simian femurs.

§ e. *The Tibias.*—These indeed present in a higher degree the shape of a straight sabre, due to transverse flattening, and characterizing the tibias of the great Apes. This recognized feature, which we observed for the first time, in May 1864, in the tibias from the Dolmen of Chamant (Oise) and afterwards in those from the Dolmen of Maintenon (Eure-et-Loire), occurs also in many tibias of the Polished-Stone Period both in France and elsewhere. Recently M. E. Bertrand, student of Chaptal College, has been fortunate enough to find in the Quaternary Drift at Clichy the remains of a Man, whose skull resembles in some respects those from Cro-Magnon, and whose tibia is remarkable for its flatness or sharp-shin form. So also Mr. Busk, by his researches at Gibraltar in 1863, has shown that the old tibias found in the caves there were all platycnemic†. This form, then, so different from that of the leg-bones of existing Men, ought to be regarded as belonging to most of the prehistoric races of Men; I do not say of all, since M. Dupont has proved that in several of the Belgian Caves the human tibias of the Reindeer Period are prismatic and triangular like ours. This is a proof of the diversity of the so-called Autochthonic races of Europe, already referred to (page 98).

Among the many tibias, however, in which we have as yet studied the platycnemic condition‡, there are none which have exhibited it to the same degree as the tibias from Cro-Magnon—none presenting so striking a contrast of the antero-posterior and transverse diameters, suggesting a resemblance to the Simian form at first sight. The great size also of these tibias drew attention to the strangeness of their shape; for when seen in profile they show a much greater fore-and-aft thickness than the largest modern tibias, but seen in front they do not appear broader than ordinary tibias. Thus in the Old Man's tibia, of which we have the shaft only, we find the antero-posterior diameter to be 54 millims. at the upper part of the

* The same "carinate" form is seen in three femurs obtained by Mr. Busk from the Caves of Gibraltar. These bones were exhibited to the Congress of Prehistoric Archæology at Norwich (in August 1868) together with casts of those from Cro-Magnon; and their very great similarity was evident to all.

† We saw them at the Congress of Prehistoric Archæology at Norwich in August 1868, where these specimens were carefully compared.

‡ I have met with this transverse flatness in the tibias of many Negroes, but less pronounced than in prehistoric tibias. This character is strongly marked in the great Negro skeleton of the Orfila Museum; other Negro tibias, however, are triangular.

fragment, 45 millims. at the middle, and 31 below: the three corresponding transverse diameters are, respectively, 37, 27, and 27 millims. The length of the fragment, comprising nearly all of the shaft, is 323 millims.; and adding the probable length of the ends wanting here, but present on another and *smaller* tibia, I make the total length of the tibia under notice to have been 41 centims. (16·142 inches) at least. These measurements abundantly show that the bone is much thicker (in a fore-and-aft direction) with respect to its length, and much narrower with respect to its thickness, than are the tibias of existing men.

§ d. *Platycnemic Bones.*—We may here offer some remarks on the nature of the structural differences between the flattened or compressed tibias, described above, and modern tibias. The latter have a triangular and prismatic shaft, thus presenting three faces and three edges. The anterior edge, or "crest of the tibia," is just covered by the skin; the other two edges are behind; one of them facing inward, just beneath the skin; the other facing outward, covered by flesh, and giving insertion along its length to the interosseous aponeurosis extending between it and the fibula. The three faces of the bones, bordered by the three edges, are:—the internal and subcutaneous face; the external face, giving insertion in its upper two-thirds to the *tibialis anticus*; and the posterior, with backward aspect, and giving insertion to several muscles. It is this posterior face which chiefly interests us now.

The two limiting edges I I′, E E′ (fig. 44), are almost parallel in the lower three-fifths of the bone; but in the upper two-fifths they gradually separate from below upwards, terminating respectively on the margins of the two condyles of the tibia. This widened portion, forming the upper two-fifths of the posterior face, is obliquely traversed, from above downwards, and from the outside inwards, by a rough line ($pp'p''$), termed the "popliteal line," commencing above the fibular articulation, and descending thence very obliquely until it touches the inner edge of the tibia. From the middle, almost, of this line another (jj'), which we call the "tibial line," goes off very obliquely; but it is much less prominent, sometimes indeed scarcely marked. It descends along the posterior face, gradually approaching the outer edge, in which it ends at about the middle of the length of the bone. These two lines divide the upper portion of the posterior face of the tibia into three surfaces, which give insertion to three muscles. The popliteal muscle occupies the great triangular space between the "popliteal line" and the inner edge ($pp'p''$, I); the space between the "tibial line," the "popliteal line," and the outer edge (pp', jj', E E′) is occupied by the *tibialis posticus*; and lastly there is the space in the sharp angle which, intercepted by the "popliteal" and the "tibial line" ($p''p'$, jj'), is occupied by the *flexor longus digitorum pedis*. These three muscles are inserted equally by their respective margins on the "popliteal line," which moreover gives throughout its length insertion to the *soleus* muscle. The "tibial line" gives insertion only to the intermuscular aponeurosis separating the *tibialis posticus* from the *flexor longus*. Lastly, towards the point of union of these two lines, at the edge of the *tibialis posticus*, and at about the middle of the bone's width, there is a nutritive foramen (N), well known as the largest of the kind in the skeleton.

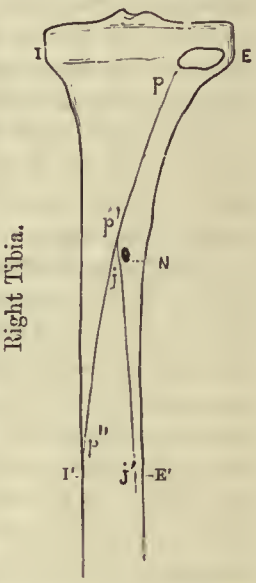


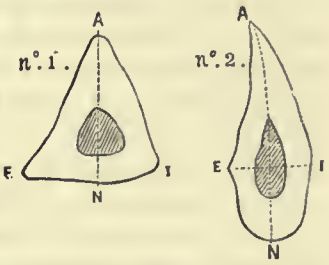
Fig. 44. Diagram of the Back View of the Upper Portion of a Right Tibia.

These descriptive details are necessary to show clearly the conformation of the platycnemic tibias. Their characteristic compression occurs in only the upper two-fifths of the shaft, which is triangular in its lower moiety. The two diagrammatic sections here given (fig. 45, 1, 2), transverse to the bone at the nutritive foramen (N, fig. 44), enable us to compare the triangular with the flat tibias.

Fig. 45, No. 1, represents the section of a triangular tibia. The three angles, A E I, correspond to the three edges, anterior, external, and internal. The side A E corresponds to the outer face, on which the *tibialis anticus* has its insertion; A I is the inner face, subcutaneous; E I, lastly, is the posterior face, in which the situation of the nutritive foramen is indicated by N; the inner portion of this face (I N) corresponds to the surface of insertion of the *popliteus*, and its outer part (N E) to the surface for the *tibialis posticus*.

Fig. 45.

Diagrams showing the Transverse Section of an Ordinary (No. 1) and of a Platycnemic (No. 2) Tibia.

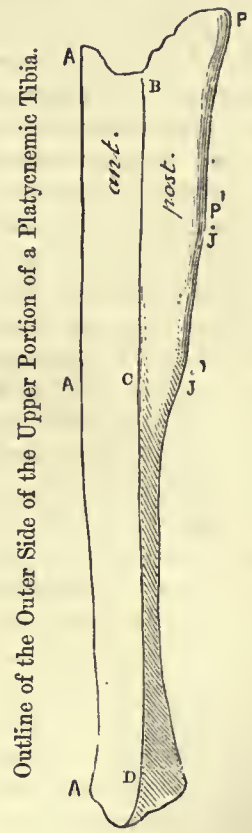


In fig. 45, No. 2, representing the section of a flat tibia, with the same letters indicating similar parts, we see that the posterior face has an entirely different shape; for its outer portion (E N) forms part of the outer face, and its inner portion (N I) forms part of the inner face, so that the only part of this posterior face which has really a backward aspect forms merely a thick edge, in which the nutritive foramen opens at N. Such a flattened shaft has therefore only two faces and two edges: 1st, an anterior edge, A, or "crest of the tibia," like that of the triangular tibias, but rather more trenchant; 2nd, a posterior edge, N, which is formed above by the upper part of the "popliteal line" (fig. 44, *p p'*), and lower down by the "tibial line" (fig. 44, *j j'*); 3rd, an inner face, formed in front by the inner face of the ordinary tibias, behind by the surface for the *popliteus*; 4th, an outer face, formed in front by the outer face of the ordinary tibias, and behind by the surface for the *tibialis posticus*. Having thus illustrated the anatomical correspondence of parts in the tibias of the two types in question, we can more easily describe the conformation of the flattened tibias.

Their outer face (fig. 46) has in its lower portion the breadth of ordinary tibias; but in its upper moiety it widens considerably; and through this widened portion a vertical salient line (B C) passes from above downwards, exactly parallel to the crest of the tibia (A A), and lower down, about where the shaft begins to be triangular, it is continuous with the outer edge (C D), which gives insertion, as before said, to the interosseous aponeurosis; and this also is partly attached to the line above described, whence it results that the portion of the bone in front of the "interosseous" line gives insertion to the *tibialis anticus* and corresponds to the outer face of the triangular tibias; whilst the portion behind it (C B *p p' j j'*) gives insertion to the *tibialis posticus*, and consequently corresponds to the outer part of the posterior face of the triangular tibias.

Fig. 46.

Outline of the Outer Side of the Upper Portion of a Platycnemic Tibia.



Likewise in examining the inner face of the sharp-shin tibias we find that throughout the compressed portion this inner face is widened. In the lower portion, where the shaft is triangular, we distinctly recognize the inner edge, which is not less evident than in ordinary tibias; but, in following this edge from below upwards, we see on coming to the level of the flattened portion that it disappears entirely; in continuance with it some slight rugosities just indicate a longitudinal line, which traverses the inner face of the flattened and widened portion, just as the "interosseous"

line passes along the opposite face. The above-mentioned line divides the internal face into two equal parts,—the one (anterior) representing the inner face of the triangular tibias; the other (posterior) extending as far as the nutritive foramen, and consequently representing the inner moiety of the posterior face, the outer moiety of which, as seen above, is turned on to the outer face of the bone. In other words, whilst the surface of insertion of the *tibialis posticus* is carried on to the outer face, the surfaces for the *popliteus* and the long flexor of the toes are added to the inner face. An oblique line, marked by rugosities, along which the *soleus* is inserted, and corresponding to the line $p'p''$ in fig. 1, indicates the separation of the surface for the *popliteus* from that for the *flexor longus*.

The posterior edge (the only portion of the posterior face which is really directed backwards) occurs on only the upper part of the shaft. High up above the level of the nutritive foramen it is thick and rounded; lower down it ends by sinking gradually into a prominent line, or true bony crest, which becomes more and more pronounced as it passes downwards until, towards the middle of the bone, gradually dying out, it rejoins the external edge of the now triangular shaft. This crest is nothing but the "tibial line" (fig. 44, jj'). Hence the posterior edge of the compressed portion is composed, above the nutritive foramen, of the upper part of the "popliteal line" (figs. 44 and 46, pp'), and of the "tibial line" below that level.

The foregoing description applies especially to the tibias from Cro-Magnon; but it is applicable also to all the other platycnemic tibias—both to that of the fossil Man found by M. Bertrand (see above, page 103), and those from the dolmens. It will serve also, with some slight differences of secondary importance, for the tibias of the anthropomorphic Apes. These differences concern the relative degree of prominence of the "popliteal" and "tibial" lines; and there would be nothing extraordinary in supposing them to have reference to the smaller development of muscles in the calf of the Ape; but the form of the tibia, and the arrangement of the lines and of the muscular surfaces, differ in nothing from the type above-described and so well characterized in the tibias from Cro-Magnon. I have already mentioned that certain Negro tibias have an analogous conformation; and I here add that in several other Negro tibias I have found a conformation intermediate to that of the triangular and of the compressed tibias. The morphological importance of this character cannot be misunderstood.

§ e. *Discussion of the Supposed Rachitic State of the Bones.*—I have given the foregoing minute description because M. Pruner-Bey has sustained, in the discussions of the Anthropological Society of Paris, the opinion that the compressed tibias from Cro-Magnon had been affected by Rickets. (See also above, page 84.) This hypothesis cannot be accepted by those who have studied the influence of Rickets on the general growth of the body and on the conformation of each bone in particular. I can here appeal to the opinion of one who for more than thirty years has studied the deformities of the human body, and whose works on Rickets have authority. M. Jules Guérin, who has examined the bones in question, when before the Anthropological Society, has declared that these bones exhibit no trace of disease, no rachitic malformation. I know, however, that in matters of science, authority should yield to demonstration; and we must therefore enter upon a detailed examination of facts.

The most characteristic feature of Rickets is the arrested development of the skeleton. M. Jules Guérin has long since shown that Rickets, in stopping the growth of the bones, tends to maintain, even after the recovery of the subjects, and even after their full growth, the morphologic type of the skeleton of the infant. Thus adults who have been rachitic in infancy are remarkable for the relative length of their arms,—the hands reaching sometimes almost to the knee. For my part, I proved (sixteen years ago) that the so-called rachitic layers are nothing but the normal bone-forming tissues arrested in their evolution, and I have thus given a histological explanation of the fact discovered by M. J. Guérin.

The skeletons of rickety persons, then, are arrested in development; their stature never reaches what it

would have been without the disease. Adults that have been rachitic are nearly always short; this shortening has relation to the duration of the disease, and it is always very considerable when the malady has lasted long enough to deform the bones. If the tibias from Cro-Magnon had really been deformed by Rickets, the disease must have lasted long; and we ought to have found the bones of the "Old Man," particularly those of his lower limbs, decidedly stunted and misgrown. Instead of this, these bones are enormous, and indicate a stature that M. Pruner-Bey himself estimates as having been not under six feet. There is no example of a rickety person having attained such a size. This is the first fact incompatible with the hypothesis under consideration.

M. Pruner-Bey thinks with some reason that a rachitism capable of deforming the bones ought to leave in their tissue, after recovery, apparent traces of its occurrence; and, in accordance, he points out indeed at several points of the skeleton, principally on the posterior extremity of the metatarsal bones, roughnesses more or less coarse, which he takes for traces of the disease (see above, page 84). In the same manner he interprets the excessive prominence of some lines giving insertion to aponeuroses or aponeurotic tendons &c. All these so-called traces of Rickets, however, far from dating from infancy, are due to old age. In very many old people the muscles and bones become atrophied; but in robust old men we habitually see, instead of this decadence of the bones, a manifest tendency to the ossification of the ligamentous, tendinous, and aponeurotic fibres inserted directly in the bone. I have many a time, when Surgeon to the Hospital for Old Men (Bicêtre), had occasion to study these effects, well known to all anatomists as *senile ossification.* Indeed they are often more strongly marked than in the Old Man from Cro-Magnon, and never bear any resemblance to the effects of Rickets.

M. Pruner-Bey, however, has had reason to believe that Rickets leaves a recognizable imprint, in the bony tissue, even after complete recovery; for this takes place *by condensation*, as technically expressed; and the reparative bony matter being disposed among the lamellæ, and filling all the interstices and pores, the surface of the bone becomes quite smooth, and appears less vascular than in the normal state. The bone itself has become harder, more massive, almost like ivory; the walls are thickened, the medullary cavity narrowed. There is nothing like this in the bones from Cro-Magnon: their weight, internal structure, and vascularity are altogether of the ordinary kind. When the cure of Rickets is not followed by the process of condensation the bone remains less dense and more vascular than in its normal state; often indeed we find here and there porosities comparable to those of rarifying osteitis. None of these or of other alterations from disease exist in the tibias from Cro-Magnon; and therefore they have never been rachitic. I venture to say that the idea of regarding the athletic Old Man of Cro-Magnon as a rickety subject could not have occurred to any one had it not been that a pathological explanation of the compression of the tibias was required to do away with the importance that comparative anatomy gives to this peculiar feature in the tibias of the Old Man. Rickets often induces a flattening of the tibia, giving it the form of a sabre-blade, convex or concave; but it is enough to examine rachitic tibias in any museum to be certain that they differ very much both from the tibias of Cro-Magnon and those of the ordinary triangular shape. The difference is so great, characteristic, and complete, that it strikes the eye at first sight.

In the first place, the flattening of rickety tibias *always results from their curvature*; a tibia remaining straight is never flattened; and, from the nature of the organic process causing the flattening, it is impossible that it should. I cannot here enter into the details of this elementary point in pathological anatomy and physiology; but I am sure that no competent person will contradict me when I affirm that the rectilineal conformation of the tibias from Cro-Magnon proves that they have not been flattened by rickets.

In the second place, rachitic deformity of the tibia is never limited to the upper part of the bone. It is in the middle of the bone, sometimes even lower down, that the alteration is greatest, sometimes reaching

almost to the instep. The old tibias in question, having the ordinary conformation in their lower moiety, and presenting a special type only in their upper portion, radically differ from rickety tibias.

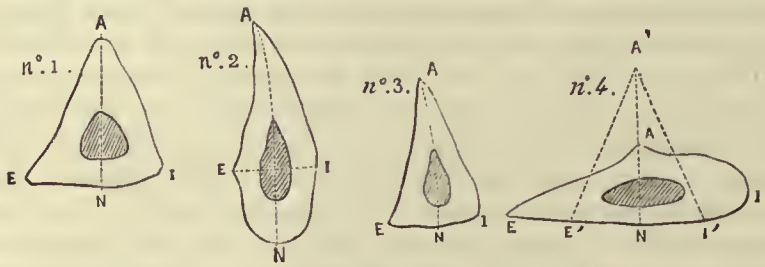
In the third place, the tibia is never flattened by rickets without the fibula being similarly affected; indeed the widening and flattening are ordinarily even much more pronounced in the latter than in the former. The fibula, however, accompanying the tibia at Cro-Magnon is not only free from curvature, but has kept its triangular form, being neither flattened nor widened. If its longitudinal crests are more salient than usual, it is because the individual was very robust and old; but this bone differs completely from rachitic fibulæ, and its form is quite incompatible with the notion of the adjacent tibia having been deformed by rickets.

Lastly (and this argument is still more decisive than the foregoing), the nature of the flattening in these old tibias, the situation and relation of the different parts of these bones, the disposition of the surfaces intended for the insertion of the interosseous aponeurosis of the muscles, have absolutely nothing in common with the condition observable in rickety tibias. Rickets sometimes produces in the tibia a fore-and-aft curvature; the width of the bone is then lessened, its thickness from front to back is increased, its anterior edge (crest of the tibia) becomes sharper, and the bone takes the form of a *convex* sabre-blade, but without ceasing to be triangular, the situation and anatomical relations of its three faces and its three edges not having been at all modified. The two lateral faces are broader, and the posterior face is narrower; this is all the difference; and the "popliteal" and "tibial" lines still mark on this posterior face the altogether normal position of the surfaces for the posterior muscles.

This arrangement is shown in the diagrammatic section No. 3, fig. 47; and we readily see that it has

Fig. 47.

Diagrammatic Sections of Healthy and of Rickety Tibias, at the level of the nutritive foramen.



No. 1. Normal Triangular Tibia. No. 2. Compressed Tibia from Cro-Magnon. No. 3. Rickety Tibia, deformed by antero-posterior curvature. No. 4. Rickety Tibia, flattened by lateral curvature.

A, Crest or front edge of the Tibia. E, Outer edge, giving insertion to the interosseous aponeurosis. I, Inner edge. N, Situation of the nutritive foramen. E N, Surface for the *tibialis posticus*. I N, Surface for the *popliteus* muscle.

nothing in common with that of the old tibias under notice, since the triangular form of the shaft is preserved, the bone not being flattened in other respects.

Tibias really flattened by rickets are always laterally curved. The convexity of the curve is always then turned inward, and occurs on the inner edge of the bone, the outer edge being concave. The latter edge being thinner than the former, the shaft is sabre-like, but it does not, like that just mentioned, resemble a convex blade—nor a straight blade*, as do those from Cro-Magnon—but a blade with a *concave* edge, like that of a

* Somewhat like that of a Dyak sword, called "Parang."—T. R. J.

yataghan. Such a tibia, moreover, is flattened *on front and back*, not on the sides. Of its two faces (No. 4, fig. 47), one is posterior (E N I), and is the normal posterior face, widened in proportion to the amount of flattening, but not otherwise modified. The other face is anterior (E A I), formed by the union of the outer (E A) and the inner face (A I). There is now no anterior edge; the crest of the tibia (A) is but a slight prominence; and this is sometimes so feeble that it is with difficulty traced upwards to the anterior tuberosity, or tubercle for the insertion of the ligament of the patella. By comparing the dotted lines E′ A′, I′ A′, which represent the two anterior faces of the normal tibia, with the line E A I, the reader will readily see how the crest of the tibia is now represented merely by a very obtuse angle, but still opposite to the nutritive foramen.

It is clear that of all the forms represented in the four diagrams (fig. 47) this is the only one offering at first sight a certain resemblance to that of the tibias from Cro-Magnon; but really it differs from them the most. The sharp edge of the sabre, which in the latter corresponds with the crest of the tibia, answers here to the outer edge—that is, to the insertion of the interosseous aponeurosis. The thick edge of the blade in the old tibias falls on the nutritive foramen and is directly behind; whereas that of the tibia rachitically flattened falls on the inner edge and is turned inwards. The reader may complete the parallel by comparing the details of No. 2, fig. 47, with those of No. 4, fig. 47, which show that the conformation of the Cro-Magnon tibias is at all points the contrary of rachitic malformations.

M. Pruner-Bey has met this view of the subject with the statement that these are the results of constitutional rickets, whilst the Old Man of Cro-Magnon had rickets only in infancy. I must reply that rickets is always constitutional and always a disease of infancy. How could a malady, consisting of an abnormal development of the skeleton and having its principal lesions near the subepiphysial cartilages, attack adult subjects? Adults, it is true, have a disease known as softening of the bone, very rare and very severe, which is neither more nor less constitutional than rickets, and which can also misshape the bones; but the deformation in this case is quite otherwise than that by rickets, and in other respects it has nothing to do with the matter. The distinction established by M. Pruner-Bey between constitutional and infantile rickets is, then, quite imaginary. He seeks otherwise himself to prove that we have here a constitutional rickets, since he believes he finds traces of this disease in other bones, such as the femur, the ulna, and the ribs. The slight arching, however, in the upper part of the thigh-bone is much higher up than the curvatures produced by rickets; the somewhat bowed shape of the upper part of the ulna is never seen in rickety ulnas, where the curvature, very rare itself, is at the middle of the bone; and, lastly, as to the ribs, they are very thick compared with their breadth, whilst rickety ribs are wide and thin. M. Pruner-Bey, then, is here in formal contradiction to the common ideas of pathological anatomy.

Lastly, if the compression of the upper end of the tibias has been observed as yet only at Cro-Magnon, we might ask if this peculiar condition of the bone was not due to some old unknown disease, and, putting aside all that is known in pathology, call it a special rachitism which flattened without bending the tibias, which deformed their upper half only, without affecting the fibulas, which left neither rarefaction nor eburnation of the bone in recovery, which thickened the ribs, bent the ulnas and femurs where they could most resist the curvature, and not where they were weakest, and which, lastly, permitted the skeleton to take on a gigantic growth. This interpretation would be simply a pathological mistake, logical at least. The tibias, however, from the Caves of Gibraltar, that of the Quaternary Man of Clichy, the tibias from the dolmens of Chamant, of Maintenon, and of many other dolmens examined in France and elsewhere, present exactly this same conformation, which has its maximum in the Anthropomorphic Apes, and of which also we find traces in several skeletons of Negroes. Is it required, then, of us, because the tibias from Cro-Magnon, older than the others, are also more like those of the great Apes, to give over to rachitism the majority of prehistoric men? Do we not see that a strictly presentable hypothesis,

if it be applicable only to a reputed exceptional individual, loses its probability in proportion as it is necessary to apply it to a greater number of facts, and becomes quite impossible when the character which it pretends to explain becomes frequent, habitual, and nearly general? We may dismiss, then, this hypothesis, the result of doctrinal prepossessions. Nor does it concern us that the flattened form of the Cro-Magnon tibias and of a great number of prehistoric tibias furnishes arguments to the developmentalists, or that their adversaries find arguments to the contrary in the large volume and fine frontal conformation of the Cro-Magnon skulls. We have to study facts, and to observe before we interpret. For my part, I consider the compression of the upper part of the tibia to be an anthropological character connected very probably, like most if not all morphological details, with functional conditions. I see reason to believe, but am far from affirming, that this conformation is in relation with the strength of the muscles of the leg, especially those of the hinder region, and that the triangular form of the upper part of the tibias is particularly observable in the peoples which have the calf well developed.

§ f. *The Fibula.*—A nearly perfect fibula, apparently belonging to the skeleton "No. 1" (page 99), is remarkable for the great depth of the longitudinal gutters for the insertion of the muscles, and for the great prominence of the ridge for the insertion of the interosseous ligament. This conformation is unaccompanied by any curvature or morbid twist of the bone; it is in relation, on the one hand, to the great power of the muscles, and, on the other, to the advanced age of the individual; for we know that in robust old men the interosseous ridge of the fibula always becomes very prominent.

§ g. *The Humerus and Ulna.*—There is nothing special in the three humeri and fragments of humeri: their *fossæ* are not perforated; their dimensions are in accordance with those of the rest of the skeleton; and they have quite the ordinary form.

So also of the bones of the forearm,—except that we may notice in the upper extremity of three of the five ulnas the slight depth of the sigmoid cavity, which contrasts with the great size of the olecranon and of the coronoid process, and that immediately below this cavity is an evident antero-posterior curvature, with the concavity directly forward, and below which the shaft of the bone is perfectly straight. This curvature is analogous to that in the same bone of certain Anthropomorphous Apes; it is altogether different from rachitic curvatures, which take place much lower down, in the middle of the bone, where it offers less resistance, and which moreover occur very rarely and in cases where nearly all the other bones have been distorted by far advanced rickets.

§ h. *The Vertebræ and Pelvis.*—The different parts of the vertebral column that have been found at Cro-Magnon offer nothing particular except their considerable size, especially the lumbar vertebræ of "No. 3" (page 101).

So also of the different pieces of the pelvis. No entire pelvis was preserved; but the fragments of a sacrum and iliac bones indicate one of great size. A male sacrum, apparently belonging to "No. 3," presents in its upper part a breadth of 116 millimètres—a considerable measurement, and much greater than the average in either sex. In fifty pelves, of all races, which I have measured in the Museum of Natural History, Jardin des Plantes, there are only four in which the breadth exceeds 110 millimètres. These are of a Frenchman from the Pas-de-Calais (114 millims.), a Turk from Algiers (113 millims.), a Turk from Smyrna (123 millims.), and a Frenchwoman (123 millims.). The sacrum from Cro-Magnon is then very broad. It is slightly curved. I could not determine its height, which is considerable; for its lower extremity is wanting.

§ 3. *Study of the Skulls.*

§ a. *The Cranial Region.*—I have already said that the Skulls are very large. That of the Old Man only is sufficiently perfect to allow of cubic measurement. Gauging it with shot I found its capacity to be

1590 cubic centimètres (97·038 cubic inches); and as the fear of breaking what remains of the orbital plates hindered my pressing the shot with force, I regard this measure as a minimum. The two other skulls could not be gauged; but I think I cannot be far wrong in saying that that of the Woman exceeded 1550 cub. centims. (94·596 cub. inches), and that of the Adult "No. 3" was but little less. We ought, doubtless, to take account of the great stature of the three individuals: we know that (other things being equal) the brain enlarges with the stature, but not in proportion to the stature; for the tallest persons have ordinarily a smaller brain, relatively to the mass of the body, than shorter people. Further, these rules are true only for a somewhat extensive series, for they allow of very numerous individual exceptions. The series from Cro-Magnon is too limited to allow of definite conclusions; but if we consider that its three individuals had a cranial capacity much superior to the average at the present day, that one of them was a female and that female crania are generally below the average of male crania in size, and that nevertheless the cranial capacity of the Cro-Magnon Woman surpasses the average capacity of *male* skulls of to-day, we are led to regard the great size of the brain as one of the more remarkable characters of the Cro-Magnon race. This cerebral volume seems to me even to exceed that with which at the present day a stature equal to that of our Cave-folks would be associated; whilst the skulls from the Belgium caves are small, not only absolutely, but even relatively to the rather small stature of the inhabitants of those caves. This is additional confirmation of what is mentioned above (page 98) respecting the difference of these two palæontological races.

The great size of the brain permits us to speak well of the intelligence of the Cro-Magnon people; but the form of the brain is not less worthy of attention than its volume, for the study of races, as that of individuals, authorizes us to attach particular importance to the development of the frontal region. Now, the coronal presents, in the profile of our three skulls, a fine elliptical curve, indicative of an elevated forehead and of a spacious frontal cavity. The length of this curve cannot be exactly measured in "No. 1," because the bregma is effaced; I may be wrong to the amount of some millimètres in estimating it at 145 millims. from behind the point where I think I find a trace of the bregma. In "No. 2" it is positively 135 millims., and in "No. 3" 148 millims., measurements nearly 2 centimètres above the present average. The frontal region is equally well developed in a transverse direction. Its minimum diameter in the Old Man is 103, in the Woman 97, and in the Adult Man 97 millims.; and this amplitude is the more remarkable as it occurs in dolichocephalic skulls.

These skulls from Cro-Magnon are indeed highly dolichocephalic, and help to confirm an opinion that I have held for many years against the School of Retzius, represented at Paris by M. Pruner-Bey. The existence of a palæontological dolichocephalic race cannot henceforth be denied. The dolichocephalism of the Cro-Magnon skulls is not such as depends on a short transverse diameter; for, on the contrary, it is considerable in these, especially in "No. 1" and "No. 3," where it much exceeds the average transverse diameter of the most brachycephalic series. It is the great length of the antero-posterior diameter which makes them dolichocephalic; and this very rarely now-a-days reaches the figure of 202 millims., which "No. 1" and "No. 3" give; and it is even exceptional now if 191 millims. (the measure of "No. 2") be surpassed.

The Cephalic Indices of our three skulls are 73·76 for "No. 1," 71·72 for "No. 2," and 74·75 for "No. 3." The mean is 73·41, and is lower than the average Cephalic Index of the large Merovingian series in the Collection of the Anthropological Society of Paris, which series is the most dolichocephalic of all the groups yet collected in France.

Comparing those from Cro-Magnon with the skull obtained by M. E. Bertrand from the Quaternary deposits at Clichy, we find the latter, which unfortunately is imperfect, to be certainly highly dolichocephalic. It appears to have had a length of 204 and a width of 138 millims., giving a Cephalic Index of 67·65 only. If there is any error, it is only of a few millimètres; but it is incontestable that the fossil

skull from Clichy is more dolichocephalic, if not than "No. 2," at least than "No. 1" and "No. 3." It is remarkable also, as are many other prehistoric skulls, for the great thickness of its walls, which are at some points 13 and 14 millims. thick; and this we scarcely see now-a-days, except in disease. I must add that the female skull from Cro-Magnon is rather thin and very light; that of "No. 3" is rather thinner, that of "No. 1" thicker, and at the same time very heavy; as it is perfect, the thickness of its walls cannot be exactly determined; but I believe it to be decidedly less than in the skull from Clichy.

In the three skulls from Cro-Magnon the occiput is greatly developed. The occipital reaches rather far behind the lambda; in "No. 2" and especially in "No. 3" it swells out prominently below and behind the parietals. This coincides, in "No. 3," with the presence of five or six rather large and somewhat deeply toothed wormian bones, which form a nearly continuous series in the lambdoid suture and its two branches. I may add that the sutures in our three skulls are but little complicated.

Another character common to these three skulls is the smallness, and even absence of the external occipital protuberance. "No. 3" (the Adult Man's Skull, C. Plate IV.), though imperfect behind, shows by the adjacent surface that this protuberance was probably wanting. In the Woman ("No. 2," C. Plate V.) there is an evident prominence, but it is very slight. In the Old Man ("No. 1," C. Plates I., II., & III., fig. 1) some median rugosities represent a rudimentary protuberance; but the *linea semicircularis* is very prominent and thick, forming a kind of semicircular ridge, which stretches transversely from one mastoid process to the other; and below this all the region of the cerebellum is flattened as far as the foramen magnum, forming a large rough surface for the insertion of the powerful muscles of the neck.

None of these skulls presents the form described by Prichard as "Pyramidal," nor even the variety of this form known as "Ogival." In the "pyramidal" form (proper) the width of the skull diminishes upwards from the base, whilst in the "ogival" the sides of the skull, parallel or sometimes divergent in their lower half, converge above the level of the parietal bosses, and meet at the middle line, forming a kind of roof; so that the transverse section, instead of being rounded at the level of the sagittal suture, as in ordinary skulls, has rather the form of a very elliptical ogive. It is not only in the length of the sagittal suture that this roof-like condition exists; it is prolonged in the upper part of the frontal bone. A very large number of skulls present in certain parts of the upper median line a slight arching: when we incline them so as to make the apparent contour of their transverse curve pass through this arching, we get the appearance of an ogive; but if we incline them a little more or less, the contour appears rounded. Now, a partial arching by no means constitutes the "ogival" form; it indicates a peculiarity of the conformation of a circumscribed region, and not a special type of cranial architecture. The skull is not really "ogival" except when the arching occupies all the median line from the lambda to the middle of the forehead, and when it makes a manifest longitudinal prominence. In this sense the skulls from Cro-Magnon cannot be considered to have the "ogival" form. "No. 1" presents towards the middle of the frontal bone, for an extent of about 5 centimètres, a certain degree of arching; but the sagittal suture is not at all prominent, and is rather flattened than "ogival." "No. 2" is very slightly "ogival" in the anterior half of the sagittal suture, whilst in "No. 3" this is not at all "ogival." This skull presents, it is true, on the median line, behind the bregma, a round and slightly prominent lump, about 3 centimètres in diameter, but having nothing in common with the "ogival" form. There are some other lumps on this skull, in which also we observe a considerable postlambdoidal prominence, made the more manifest by a series of wormian bones occupying the two branches of the lambdoid suture. These characters are produced when, during infancy, the volume of the brain increases more rapidly than usual; for the distended skull gives way in its least-resisting parts, especially at the sutures; and hence arise such modifications as we see in "No. 3."

§ b. *The Facial Region.*—The skull "No. 3" has lost all its facial region; but we can still get some indications of the state of the lower edge of the *os frontis.* The superciliary arches are very much developed, the glabella rather less so; below it the frontal retreats markedly, and shows that the root of the nose was rather strongly depressed. The outer orbital processes are 112 millims. (4·410 inches) apart, indicating that the face was very large.

The face of the Old Man presents quite unusual characters. The disproportion of height and width strikes us at once; the face seems at once very short and very broad; but when we take the compasses we find that the face is not really short, but appears so only in contrast with its great breadth; and the very sudden and considerable contraction just below the lower edge of the malar bone makes this still more apparent. The alveolar region, indeed, is not broader than in an ordinary man; hence the cheek-bones just above are excessively prominent.

The distance between the root of the nose and the *spina nasi,* or the height of the orbito-nasal region, is 51 millimètres; and this agrees with the average of ordinary men's skulls; but I have never seen a corresponding transverse development in dolichocephalic heads; and it is altogether exceptional, even in the largest brachycephalic skulls. Thus the bizygomatic diameter reaches 143 millims.; and among one hundred and twenty-three brachycephalic crania which I have measured there is but one (No. 11 of St.-Jean-de-Luz) in which the diameter amounts to 144 millims.; whilst in all the others it is 140 millims. or less. So also the distance between the two suborbital foramina is 63 millims. in the Old Man, and none of the other skulls I have measured show a greater distance than 62 millims.

In establishing the proportion of the height of the orbito-alveolar region to its breadth, represented by the bizygomatic diameter, we find it as 35·6 : 100. I have made the same calculation for all the skulls of the Basque series of St.-Jean-de-Luz, in which brachycephalics largely predominate. In none of these fifty-seven Basque skulls is the proportion less than 36; it often rises beyond 39, and may attain 40 and more; and its mean is 38·3. Hence we may comprehend why the face of the Old Man of Cro-Magnon, though of the ordinary height, seems so very low,—namely, owing to its great breadth.

This extraordinary breadth is due exclusively to the transverse development of the orbits; for the breadth of the nose, of the interorbital space, and of the lower part of the nostrils is not above the general average, and is even below the mean of male skulls.

The disposition and dimensions of the orbits certainly constitute one of the most remarkable characters of the face of the Old Man. They have a very long rectangular shape, with the corners rounded, and with the bases inclined from above downward and from within outward. They are 44 millims. broad and 27 millims. high (C. Plate I.). For comparison with these I will cite some measurements from a register of 250 European crania. Only one skull (Basque of Zaraus, No. 23) gives an orbital width of 44 millims. Five others have a width of 43; and all the rest have less. The orbits, then, of this Cro-Magnon skull attain the maximum limit of width; but, on the contrary, their height is almost at the minimum limit; for I know of only one skull (No. 5 of the Second Merovingian Series of Chelles) in which the height of the orbit is so little as 26 millims. In three others it is 27 millims., as in the Old Man's skull; and it is remarkable that these three come also from the Merovingian Sepultures at Chelles; it is there only that I have found orbits comparable with those of "No. 1" from Cro-Magnon (that is to say, at once very broad and deep), three of the four Merovingian skulls cited above having the orbital width of 42, 42, and 41 millims. respectively.

In working by percentage to obtain the Orbital Index, I find that, the transverse diameter of the orbit in the Old Man being represented by 100, the vertical is only 61·36, the lowest I have met with. That of No. 5 of the Second Merovingian Series is scarcely higher (61·90). Two other Merovingians give 64·28

and 65·85; whilst I find a Basque of St.-Jean-de-Luz with 67·44. All the others of 250 skulls whose Orbital Index I have calculated exceed 70; and yet there are only three in which this Index is between 70 and 73; so that the mean Orbital Index varies, in different series, between 82 and 84. These comparative figures signalize the peculiar conformation of the orbits of the Old Man of Cro-Magnon.

The profile of this skull is not less curious than the face-view. Below a very large glabella, the root of the nose is deeply hollowed; and this depression, very remarkable in itself, is rendered still more striking by the disposition of the nasal bones. The ridge of the nose, slightly depressed at its base, rises again almost immediately and advances boldly forwards, making a rapid curve with the concavity directed rather forward and especially upward, so that the lower ends of the *ossa nasi* are placed 18 millims. in front of a line dropt vertically from the fronto-nasal suture. Below this enormous projection, the line of the profile presents a depression not less singular; for it retreats very obliquely to the level of the lower part of the nostrils, where it bends again to pass very obliquely forward, and to reach, without any further curve, the edge of the alveolar process. In studying this line of profile and the bony structure around it (C. Plate I.), we see that the skeleton of the face is nearly vertical from the glabella above to the lower edge of the nasal fossæ, and that below this latter level it runs, on the contrary, very obliquely forwards. In other words, the upper part of the face is very orthognathous, whilst the alveolar region is very prognathous. Thus it is proved by the goniometer that Camper's facial angle, the summit of which, as we know, is placed at the level of the *spina nasi*, gives a good opening of 84°; whilst the alveolar facial angle, with its summit at the lower edge of the alveolar process, is no more than 75°.

In spite of the great obliquity resulting from the alveolar prognathism, the direction of the sockets (and necessarily of the teeth) is very nearly vertical; and in the lower jaw we can see that there the incisors were vertical also. We have, then, here only a partial prognathism, exclusively limited to the upper alveolar arcade.

I have referred to the level of the *spina nasi*; this is indicated by the meeting of the upper edge of the alveolar arcade and the lower edge of the opening of the nostrils; the *spina nasi* itself is wanting. Moreover it is this which is observed when the alveolar prognathism is very much pronounced.

Although the palatine vault is rather large, its length and breadth, scarcely above the average, are not at all in proportion to the great antero-posterior and transverse extent of the facial region; moreover it is very slightly concave. What specially characterizes it is its median prominence. We know that this vault is sometimes transversely concave, more often quite flat, and sometimes more or less convex. In the last condition, which is somewhat rare, the two palatine plates thicken as they approach the median line, so that their suture forms a kind of longitudinal ridge along the middle of the vault. I have met with this, more or less pronounced, in some skulls in the Collection of the Anthropological Society of Paris; but there are only three or four in which it is well marked, and none of them present it in the same degree as in this skull from Cro-Magnon. Here, indeed, the median elevation is so considerable that the two lateral parts of the vault are merely straightish gutters. I know of only one skull that can in this respect be compared with that of the Old Man; and that is the one I presented and described at the Meeting of that Society on February 6, 1868*, and which Dr. Prunières had sent to me in the name of Abbé Boissonade. The finding-place of this skull, unfortunately, is not well authenticated; it is believed to have come from the Cave of Meyreuis (Lozère); but without doubt it is very ancient; it is moreover brachycephalic, and resembles that from Cro-Magnon only in the conformation of the palatine vault.

The lower jaw of the Old Man's skull is of great interest; but all its characters cannot be studied, as the two condyles and one of the ascending rami are wanting. All the alveolar cavities are open; consequently all the

* Bulletins de la Société d'Anthropologie, 2de Série, vol. iii. p. 129.

teeth were present at death. The teeth were large, especially the molars, judging from their sockets. The body of the jaw has nothing remarkable. The mental process is very prominent; the *apophyses geni* are well developed. The body of the jaw is of somewhat large size, but in proportion to the face. The curve of the alveolar arcade is very divergent, so that the wisdom-teeth are much further apart than the first true molars are. This curve is rather hyperbolic than parabolic, as is rather frequently seen at present in the so-called Germanic races; but it is rare for the divergence of the two halves of the curve to be so great as it is in this case. Altogether these characters are in very strong contrast with the well-known description of the jaw of the Naulette, where the alveolar curve is rather convergent than divergent, the *apophyses geni* are replaced by a foramen, the mental process is entirely absent, and the thickness of the body is enormous in proportion to its height. In all these features the jaw of the Naulette departs from the human type, going towards that of the Apes; whilst the Old Man's jaw presents rather an exaggeration of the features which distinguish the human type from that of the Anthropomorphous Apes. This is an additional proof of the great difference existing between the Quaternary Man of Cro-Magnon and the Cave-man of Belgium.

The most curious part of the Cro-Magnon jaw is its ascending ramus, which is nearly perpendicular to the axis of the body; the angle, however, is much rounded. This portion presents on its two faces strongly marked inequalities, for the insertion of the masticatory muscles; but, taken altogether, it is flat—that is, its infero-posterior edge is not inflected either inwards or outwards. Its thickness is not greater than that seen in robust men. Its breadth, however, is extraordinary; for, measured across at the level of the base of the coronoid process, it is 49 millims. The oblique diameter, from the angle of the jaw to the lower part of the anterior edge, is 44 millims.,—less than the transverse diameter, contrary to what we usually find. This difference is due to the rounded form of the angle of the jaw. There is no European jaw in the Collection of the Anthropological Society of Paris having dimensions approaching the above. The results of measurements made in four of our series are given below. In the series of modern Parisians and in that of the Merovingians of Chelles, I have taken male jaws only, the corresponding crania guiding me in this selection. In the series of St.-Jean-de-Luz and in that of Chamant, the jaws having been parted from the crania, the separation of the sexes would have been somewhat arbitrary. Measuring all these jaws indiscriminately, I have obtained the following results:—

		Dimensions of the Ascending Rami of the Lower Jaws.			
		Transverse Diameter.		Oblique Diameter.	
		French. millim.	English. inch.	French. millim.	English. inch.
Old Man of Cro-Magnon		49	1·929	44	1·732
Modern Parisians (only men).	Maximum	40	1·575	41	1·614
	Minimum	29	1·142	30	1·181
	Mean	32·83	1·292	35·58	1·401
Basques of St.-Jean-de-Luz (XVth Century).	Maximum	37	1·457	41	1·614
	Minimum	27	1·063	28	1·102
	Mean	30·69	1·260	32·77	1·290
Merovingians of Chelles (VIIth Century A.D.).	Maximum	38	1·496	39	1·535
	Minimum	28	1·102	28	1·102
	Mean	32·57	1·299	32·30	1·272
Dolmen of Chamant (Oise). (Age of Polished Stone.)	Maximum	35	1·378	37	1·457
	Minimum	31	1·220	30	1·181
	Mean	33·37	1·313	34	1·339

This Table shows clearly that the ascending ramus, the breadth of which is in relation with the volume of the masticatory muscles, is far more developed in the Old Man of Cro-Magnon than in all the Europeans, ancient or modern, that I have studied in the Collection of the Anthropological Society. To appreciate the significance of this character, it is well to remember that the great size of the ascending ramus is now-a-days chiefly noticeable among savage races. Thus in seven lower jaws, from Oceania, which are in the Collection of the Anthropological Society, there are three which surpass in this respect the maxima observed in our European series. Three jaws, of a Bushman, Kafir, and Javan, figured full-size in Plate I. of Barkow's great work*, also have dimensions greater than these maxima, but, as in all other cases, less than those of the jaw under notice from Cro-Magnon. This is shown by the following Table, in which also I have introduced the measurements taken from the skull of *Troglodytes Aubryi* given to the Anthropological Society by Gratiolet, and from five other skulls of Anthropomorphous Apes, which I have deposited in the Society's Collection:—

	Dimensions of the Ascending Rami of the Lower Jaws.				
	Transverse Diameter.		Oblique Diameter.		
	French. millim.	English. inch.	French. millim.	English. inch.	
Old Man of Cro-Magnon	49	1·929	44	1·732	
Man of Tahiti	43	1·693	44	1·732	Collection of the Anthropological Society of Paris.
—— of the Isle of Pines (New Caledonia).	40	1·575	44	1·732	
—— of New Caledonia	44	1·732	46	1·811	
Bushman (male)	41	1·614	42	1·654	Barkow, fig. 13.
Kafir (male)	41	1·614	41	1·614	——, fig. 12.
Javan (male)	42	1·654	42	1·654	——, fig. 10.
Troglodytes Aubryi (young)	40	1·575	40	1·575	Collection of the Anthropological Society of Paris.
—— *niger* (adult)	48	1·890	52	2·074	
—— *Aubryi* (adult)	57	2·244	53	2·087	
Gorilla tchego (adult male)	73	2·874	70	2·756	
—— *Savagii* (adult male)	72	2·835	68	2·677	
—— —— (adult female)	56	2·205	59	2·323	

Thus, as to the dimensions of the ascending ramus, the Old Man of Cro-Magnon takes his place between semisavage or uncivilized races and the Anthropomorphous Apes. We must not, however, exaggerate the importance of this fact. In the first place, this Old Man was probably larger and stronger than most of those with whom we have compared him, and it is natural that his jaw should require a very broad surface for the insertion of the masticatory muscles; and, secondly, we must not forget that, though the ascending ramus presents unusual dimensions, recalling those of the Apes, the conformation of the body of the jaw is, on the contrary, quite different from that characterizing the Simian type.

The facial region of the Woman (C. Plate V.) differs, at first sight, altogether from that of the Old Man; but on closer examination we find most of the characters above described, though in a much feebler form. Thus the upper part of the face is orthognathous†, although the tooth-sockets are prognathous; but the

* H. Carl Leopold Barkow, 'Comparative Morphologie der Menschen und der menschenähnlichen Thiere,' part 2, pl. 1. figs. 10, 12, and 13.

† The absence of the left temporal bone prevents the facial angles being measured; but there is no doubt of these angles being very open.

alveolar region is much less oblique than in the Old Man. The depression at the root of the nose also is much less, though very noticeable; the distance between the cheek-bones is not so great; the orbits are shorter and narrower, giving a much higher Orbital Index, though still much lower than that of the European races. We may add that all the contours are softer, and that the muscular imprints are less strongly marked. These differences are considerable: some of them may certainly be attributed to difference of sex; but how far do the others depend on this cause? This will remain doubtful as long as there is only one of each sex for comparison; and we still have to ask if the characters, so remarkable, of the Old Man's face belonged to all the individuals of his race and his sex,—or if, by accident, the first man's skull taken from the Caves of Périgord happens to be that of an individual more or less exceptional, presenting an exaggeration of the characters of his race. However this may be, even when we abstract the influence of sex, and only admit as characters of the Cro-Magnon race those which are common to the two skulls "No. 1" and "No. 2," there still remains an *ensemble* of features sufficient to distinguish this race from all existing races, and especially from that other Quaternary race, remains of which have been found in the Caves of Belgium.

MEASUREMENTS OF THE CRANIUM FROM CRO-MAGNON.

I. Table of Measurements of the Cranium properly so called.

		No. 1.		No. 2.		No. 3.	
		French.	English.	French.	English.	French.	English.
Diameters.		millim.	inch.	millim.	inch.	millim.	inch.
Antero-posteral, maximum	A	202	7·953	191	7·520	202	7·953
——, iniac	B	199	7·835	184	7·244	190?	7·480
Transversal, maximum	C	149	5·866	137	5·394	151	5·945
——, biauricular	D	122	4·803				
——, bitemporal	E	141	5·551	132?	5·197		
——, frontal, minimum	F	103	4·055	97	3·819	97	3·819
Vertical, basilo-bregmatic	G	132	5·197				
Curves.							
Circumference, medio-vertical:—							
Frontal	H	145*	5·709	135	5·315	148	5·827
Parietal	I	133*	5·236	133	5·236	133†	5·236
Supraoccipital	J	70	2·756	71	2·795	76†	2·992
Cerebellar	K	57	2·244				
Length of foramen magnum	L	36	1·417				
Naso-basilar line	M	104	4·095				
Total median circumference	N	545	21·457				
Inio-frontal curve (H+I+J)	O	348	13·701	339	13·347	357	14·055
Occipito-frontal curve (O+K)	P	405	15·945				
Total horizontal circumference	Q	568	22·363	540	21·260	565	22·248
Preauricular circumference	R	272	10·709	236	9·291		
Postauricular circumference	S	296	11·654	304	11·969		
Total transverse circumference	T	463	18·229				
Supraauricular circumference	U	330	12·992	....	....	306?	12·047
Width of foramen magnum (for the *length*, see L)	V	29	1·142				
Cephalic Index, C : A (=100)	X	73·76	....	71·72	....	74·75	
Frontal Index, F : C (=100)	Y	69·12	....	70·80	....	64·23	
Vertical Index, G : A (=100)	Z	65·34	....				
		cub. cent.	cub. inch.				
Internal Capacity	..	1590	97·038				

* The measurements H and I of No. 1 want precision, because the exact position of the bregma is rather uncertain. The sum, however, of H+I is 278 millims.

† The measurements I and J in No. 3 together amount to 209 millims.; but the presence of several large wormian bones in the lambdoid suture makes the position of the lambda somewhat uncertain. The parietal curve (I) has been measured from the bregma at the top of the occipital bone. If we place the lambda at the centre of the middle wormian bone, the parietal curve (I) will not be more than 120, and the supraoccipital (J) will amount to 89 millims.

II. Table of Measurements of the Face.

	No. 1.		No. 2.		No. 3.	
	French.	English.	French.	English.	French.	English.
Breadth of the Face.	millim.	inch.	millim.	inch.	millim.	inch.
Distance, external biorbital	116	4·567	109	4·291	112	4·410
——, internal biorbital	103	4·055	95	3·740	100	3·937
—— between the two foramina, supraorbital	54?	2·126	53	2·087		
—— ,, ,, suborbital	63	2·480	54?	2·126		
——, bimaxillar, greatest	101?	3·976	93	3·661		
——, bimalar, greatest	112?	4·410	108	4·252		
——, bijugal, greatest	128?	5·039	112?	4·410		
——, bizygomatic, greatest	143?	5·630				
Orbits.						
Breadth	44	1·732	40	1·575		
Height	27	1·063	28·5	1·122		
Depth	54	2·126				
Nasal Region.						
Length of the Nasal Bones, median	23	0·906				
——, lateral	26	1·024				
Breadth of the Nose, upper	10	0·393	14	0·551		
——, least	8	0·315				
——, lower	18	0·709				
Interorbital thickness	24	0·945	25?	0·984		
Greatest breadth of the nostrils	23	0·906	24	0·945		
Height of the Face.						
Height from the Root of the Nose to the *spina nasi*	51	2·008	49	1·929		
—— from *spina nasi* to the alveolar border	19	0·748	16	0·630		
—— from supraorbital point to the alv. bord.	91	3·583	82	3·228		
—— of the cheek-bone	27	1·063	26	1·024		
Orbito-alveolar height	51	2·008	42	1·693		
Auricular Region.						
Distance from the top of the mastoid process to the supramastoidean line	35	1·378	32?	1·260		
—— from anterior edge of the auditory canal to the Jugal point	67	2·638				
—— —— to the external edge of the orbit	83	3·268	73?	2·874		
Palatal Vault.						
Length	52	2·074				
Breadth, backwards	37	1·457				
——, at the first molar	36	1·417	36?	1·417		
——, at the premaxillary bone	24	0·945	26?	1·024		
Depth	11	0·433	15?	0·591		
Distance from the palatal vault to the foramen magnum	51?	2·008				

N.B. The majority of the first group of measurements (Breadth of Face) have not been taken from the specimens, because in two of them one-half of the face cannot be used, as it wants one of the two points of measurement. The dimensions given have been obtained by taking the distance from the uninjured points of measurement to the median line, and multiplying it by two. The dimensions in question are accompanied by a point of interrogation.

§ IV. Conclusion.

A general view of the different features and peculiarities that we have above described presents a remarkable union of characters of superiority and of inferiority in the Cro-Magnon race. The great volume of the brain, the development of the frontal region, the fine elliptical profile of the anterior portion of the skull, and the orthognathism of the upper facial region (giving a considerable openness to Camper's facial angle), are incontestable characters of superiority, which are met with usually only in the civilized races. On the other hand, the great breadth of face, the alveolar prognathism, the enormous development of the ascending ramus of the lower jaw, the extent and roughness of the muscular insertions, especially for the masticatory muscles, give rise to the idea of a violent and brutal race, especially when we are nearly certain that the Woman was killed with the blow of an axe and that the Old Man bore on his femur traces of an old and severe wound. We may note, too, the simplicity of the sutures and their probably precocious closure, proceeding from before backwards, as in savages. We may add that the athletic conformation of the bones, and particularly the extraordinary prominence of the *linea aspera* of the femur, bears witness to the great development of muscular power. Lastly we may refer to three characters (the excessive breadth of the ascending ramus, the subcoronoidal curve of the ulna, with its very shallow coronoid cavity, and, above all, the flattening of the tibias) as being more or less manifestly Simian; and we shall thus complete the picture of a race which in some of its features attained the highest and noblest stages in human morphology, and in other traits descended below even the lowest of the anthropologic types at present existing.

The antithesis seems, at first sight, paradoxical; and nevertheless is it not the anatomical confirmation of what the discoveries of Henry Christy and Edouard Lartet have already taught us as to the life and manners of the Cave-dwellers of Périgord? The men who in the Quaternary Period were the initiators of progress and the precursors of civilization, they whose were the remarkable works of industry and art which we wonder at to-day, necessarily combined with the intelligence of the inventor and workman the physical force and habits of war and the chase which alone at that time could assure subsistence and security. At the present day, with our powerful metals, our terrible arms, and our country long since cleared—with all the resources furnished by agriculture and commerce, we can live peaceably the life of civilization; but when immense forests, which the axe of stone could not fell, covered the greater part of the soil, and, instead of agriculture, hunting only could provide sustenance for Man, when the immediate

wants of life necessitated a constant war against wild animals such as the Mammoth, and when at last the hunting territory, the sole resource of a tribe, had to be continually defended against the encroachments and attacks of neighbouring tribes, men were obliged, under pain of destruction, to accommodate themselves to circumstances and live the violent life of savages.

The Cave-dwellers of Cro-Magnon were then savages, like all men of their time; and we are not astonished that such conditions of existence have left strong traces in their skeletons. But these barbarians were intelligent and improvable; and whilst continuing to struggle with Nature and to war against their kind, they knew how to make leisure enough to increase their knowledge, to develope their industry, and, still further, to rise to the culture of the arts. These aptitudes, so precious—rare at all epochs, but truly extraordinary in respect to the time they were manifested among these Cave-folk—could not have dawned but by favour of a fine cerebral organization, of which we have found the morphological expression in the skulls of the Cro-Magnon race.

What has become of this remarkable race, appearing to us as a shining point amidst the darkness of the far past? In cultivating the arts which embellish life and soften manners, did it lose some of the warlike energy which could alone serve to defend it against the fierce aggressions of surrounding barbarism? Did it succumb, like those who, coming before their hour, disappear, starved by the inclement conditions among which they try to introduce a premature progress? Or rather, surviving that inevitable struggle in which its civilization perished, did this race escape extermination but to fall into the universal barbarism, and to lose at length, under the isolated or combined influences of crossing, of social change, and of the gradual transformation of the fauna and the climate, the anatomical characters which had formerly distinguished it? We may hope that future discoveries will furnish new elements for the solution of these important questions; but at present we can only be sure of one thing—that the race of Cro-Magnon was entirely different from all other known races, ancient and modern.

Note.—M. Pruner-Bey thinks that he has found among the modern Esthonians the type of the ancient race of Cro-Magnon (see page 89). To comprehend fully the importance of this proposed relationship, we ought to refer to the discussions that took place, six years since, in the Anthropological Society of Paris on the question of the Prehistoric Races of Europe. Admitting with Retzius that the aborigines were brachycephalic and that dolichocephalism was introduced by the Kelts from Asia, M. Pruner-Bey has rejected all the facts opposed to this doctrine that have been offered to the Society. He has associated with the Keltic race all the dolichocephalic

skulls found in the megalithic monuments, and even in certain caves, the date of which, in his opinion, has not been exactly established, or the floor of which he supposes to have been more or less disturbed; and as for the true Prekeltic aborigines, he seeks to prove that they all belong to one race, which he terms the Mongoloid Brachycephales. In sustaining this opinion, he has many a time had to appeal to ingenious hypotheses which could throw doubt on the value of the facts quoted by those holding different opinions. Affairs were thus when the discovery of the skulls in the Cro-Magnon Cave brought the question to a new phase. In this case the authenticity of the date was so sure that it was not possible to deny the existence of a dolichocephalic race contemporary with the Mammoth, and far earlier, therefore, than the arrival of the Kelts. Unable then, in the presence of such a fact, to maintain his general theory of the Mongoloid Brachycephales, M. Pruner-Bey endeavours to prove that, if the Cro-Magnon people were not brachycephalic, they were at least Mongoloid; and as it would seem singular and contrary to all expectation that a race of the Mongoloid type would be at the same time highly dolichocephalic, he has been led to weaken this contradiction by referring the Cro-Magnon race to the modern Esthonians, who, without being really dolichocephalic, have a longer head than all the other races who speak the languages of the Mongolian group.

Having discussed at length this hypothesis at the Meeting of the Anthropological Society, July 18, 1868, I need not here reproduce the two large tables in which I compared the measurements of the Cro-Magnon skulls with the Esthonian skulls in the Museum of Natural History; but I may add that in all points of view, whether we consider the absolute dimensions of the different parts of the cranium and of the face, or if we determine their relationships by the percentage method—whether we compare the individuals, or take the averages, there exist between the Cro-Magnon and Esthonian races radical differences, as great as exist between any two European races ancient or modern.

X.

REMARKS ON THE HUMAN REMAINS FROM THE CAVE AT CRO-MAGNON*.

By M. de Quatrefages, Professor of Anthropology, Museum of Natural History, Paris.

Engaged in other studies, I have made only a rapid examination of these specimens, and have nothing to add to the elaborate descriptions by MM. Broca and Pruner-Bey; hence I limit myself to some general reflections on these interesting remains.

These skulls afford another opportunity of instruction to anthropologists, the importance of which can hardly be exaggerated. M. Joly has said that in all populations we find both brachycephalic and dolichocephalic heads; and he has good reason for the statement as far as European peoples are concerned. Has, then, this characteristic lost all its value? No—although no one can now grant it to be of such importance as Retzius considered it when he divided all the races on the globe into dolichocephalic and brachycephalic. We now know that even amongst populations once regarded as most definitely characterized by one or the other of these features, there are exceptional groups. The Andamanians, for example, are positively Negroes, and positively brachycephalic, although until lately we may have truly set down all Negro races as dolichocephalic. It follows therefore that these cephalic conformations have not the value formerly attributed to them; there are, however, sufficient facts to enable us to affirm that they have still a real importance in the characterization of the subdivisions of a great race.

We have before our eyes proofs that we must apply what I have been saying to fossil Man. I am one of those who, taking account only of the best demonstrated facts, have thought it very probable that Western Europe was peopled at first by a small and brachycephalic race. With some limitations, and guided by certain facts, I supposed it possible that populations existed in Europe presenting the two cephalic types; but I did not think that any fact authorized us to suppose that the brachycephalic type had at so early an epoch reached Western France. In presence of the bones before us it is evident that my opinion must be changed; and I do not hesitate to take the side of M. Broca, at least in that which con-

* These remarks were spoken at the Meeting of Scientific Societies (Congress of Delegates) at the Sorbonne, April 16, 1868.

cerns the coexistence of the two types. It is clear that the Cave-dwellers of the Stone Age, who fought the Elephant and Rhinoceros with their flint weapons, are represented in their remains by two distinct races. This very thing leads me to insist on a consideration arising from M. Pruner-Bey's Memoir. He informs us that these old skulls would answer feature by feature to the description of certain Esthonian skulls. At any rate it is not so with those which I have received from St. Petersburg, and which are in the Museum of Natural History. These are either brachycephalic or mesaticephalic; not one approaches the well-marked dolichocephalism of the skulls from Cro-Magnon. The skulls in our Museum correspond plainly with the Esthonian skulls described by Von Baer about 1816. They would also correspond in type to the crania (of the Reindeer Age) found in Belgium by M. Dupont. I cannot have the least doubt about it after the exclamation uttered by the latter on seeing the skulls I received from St. Petersburg. It must be, then, that this little province of Esthonia possesses, in the existing population, the two types indicated by the fossil human remains.

I may add that of the three skulls in our Museum, one recalls essentially, by the whole of its characters, the Mongolian and Chinese type; the bones are robust, and the canine fossa is slightly marked. The other two (of which one at least is more plainly brachycephalic) are distinguished by very different characters: they are remarkable for their slenderness; the canine fossa is deeply hollowed; the lower jaw of one of them reproduces nearly all the characters of the famous jaw from the Moulin Quignon, and resembles it in particular by the premature loss of the teeth.

Everything, then, shows that the men who preceded us in Europe were already divided into several races, as I have elsewhere indicated.

It is evident, moreover, that the Cro-Magnon skulls introduce new elements into the question of European origins, and oblige us to take up again some of the questions already treated of by the Anthropological Society, particularly as to the ethnic composition of the Basque populations.

Before I finish I would ask my two colleagues permission to criticise some observations they have made. Treating of certain characters, they have said that some were a sign of inferiority, others of superiority. M. Broca has pointed out the curve of a femur as furnishing a point of comparison between the Man whose remains are before us and the Gorilla; whilst M. Pruner-Bey says that a slight degree of rickets suffered in infancy, and of which he believes he finds other traces, has sufficed to account for this condition of the femur. M. Pruner-Bey, however, sees a sign of inferiority in a faintly marked disposition of the parietal

bones to form a ridge at the sagittal suture. This feature, indeed, is found among some races of men justly placed near the lowest stages of civilization; but I must say that I have found it recently in a perfectly pure white man—one of the most distinguished Delegates who have come to the Congress from America. It was indeed far more strongly marked in him than in any skull in our Museum.

From these facts and many others, I conclude that we ought to be very careful in assigning significance to characters of which in reality we know neither the cause nor the value; and I should always with regret employ expressions liable to deceive others not acquainted with their real value, and likely to lead them to believe in agreements between Man and Apes, of which nobody is thinking.

SKETCH MAP OF A PART OF THE VALLEY OF THE VEZÈRE,

including several of the PREHISTORIC STATIONS, namely those of LAUGERIE HAUTE, LAUGERIE BASSE, GORGE D'ENFER, CRO-MAGNON, and LES EYZIES.

(Scale $\frac{1}{20,000}$, or 3·168 Inches to a Mile.)

This Map indicates the position of the Cro-Magnon Cave: it also gives the localities of Laugerie Haute, Laugerie Basse, & the Gorge d'Enfer more correctly than the Map at page 19.

XI.

ON THE EMPLOYMENT OF SEWING-NEEDLES IN ANCIENT TIMES.

By M. E. Lartet, Professor of Palæontology, Museum of Natural History, Jardin des Plantes, Paris.

"No collection of antiquities," says the learned Mongéz (Article "Aiguille à coudre," in the Dictionary of Antiquities, 'Encyclopédie Méthodique,' 1786), "presents any ancient needles, although Greek and Roman authors frequently mention needle-work and embroidery. If needles," he adds, "were at that time made of steel, like ours, rust has destroyed them all."

The art of working iron has been known, as we are well aware, from time immemorial. In the Fourth Chapter of the Book of Genesis it is said that men had learned from Tubal-cain the art of forging iron and brass (bronze). Homer often mentions iron; and in the 'Odyssey,' Book ix. line 391, we find a comparison of the noise made by the burning stake plunged by Ulysses into the eye of Polyphemus to that of the red-hot hatchet or axe-head hissing in the cold water into which it has been plunged by the smith to give it hardness,—an operation, adds the poet, by which iron gets its strength: hence we may conclude that even the art of tempering was known*.

Nevertheless for those distant times of high antiquity, and even down to the end of the Middle Ages, we know only of needles of bone and of other metal than iron, namely bronze. It seems indeed that the ancients gave the preference to bronze in the manufacture of their most delicate surgical implements.

The oldest mention of bronze needles occurs in the "Batrachomyomachia," if this burlesque poem can indeed be attributed to Homer. It is there said, verses 129 and 130, that the combatants (the Mice) are armed with a long bronze needle in place of a lance†. I have to thank M. Mérimée in the

* *Ὡς δ' ὅτ' ἀνὴρ χαλκεὺς πέλεκυν μέγαν ἠὲ σκέπαρνον*
εἰν ὕδατι ψυχρῷ βάπτει μεγάλα ἰάχοντα,
Φαρμάσσων· τὸ γὰρ αὖτε σιδήρου γε κράτος ἐστίν.—Od. ix. 391–93.

† Batrachom., lin. 129 & 130, ed. F. Franke, Londini, 1828.

. . . . . *ἡ δέ νυ λόγχη*
εὐμήκης βελόνη, παγχάλκεον ἔργον Ἄρηος.

. . . . . and their lance (is)
a long needle, the solid bronze work of Ares.

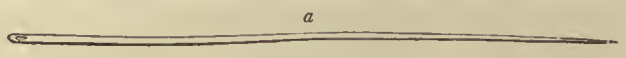
first place, and M. J. Desnoyers, for enabling me to make this curious reference*.

We know, moreover, that certain oriental nations were renowned for various kinds of needlework. Phrygia was said to produce the finest embroideries of antiquity; and Babylon was celebrated for the magnificence of her tapestries†. Thus also we find that in later times the Romans gave the name of "acus Phrygiæ" ‡ to the embroidery-needle; whilst a tapestry-needle was known to them by the name of "acus Babylonis" § or "acus Semiramia" ‖.

The art of sewing must have been carried to great perfection by the Egyptians also, if, at least, we may judge by the repairs made by hand in tissues of the greatest delicacy. M. Prisse d'Avesnes has informed me of his having seen in an ancient Egyptian shawl, comparable with modern shawls of Indian muslin, some darnings that could only have been effected by means of an extremely fine needle.

Figs. 48 *a and* 48 *b.*

Ancient Egyptian Needles, drawn by M. Prisse d'Avesnes.



The Egyptian Museum in the Louvre possesses a number of bronze sewing-needles, of different shapes and sizes. Most of them are round or oblong at the "eye" or perforated end. Those figured in Wilkinson's work 'On the Manners and Customs of the Ancient Egyptians,' 3rd edit. 1847, vol. iii. p. 384, woodcut, no. 412, are rather thin and have an oblong head. These are from 3 to 3½ English inches in length. The bronze needle found at Pompeii and figured in the Article "Acus" of the 'Dictionary of Antiquities' by Anthony Rich, is still thinner and shorter; it is scarcely 3 centimètres (about 1½ inch) long.

Among the Romans the word *Acus* was used both for toilet-pins and for sewing-needles. The *Acus crinalis*, or the hair-pin of the Roman ladies, was made

* The idea of needles and their use in the time of Homer is associated also with a passage in the 'Iliad' (Book iii. lines 125, 126), where Helen is represented as being occupied in her palace with tapestry-work.

. . . . . ἡ δὲ μέγαν ἱστὸν ὕφαινεν,
δίπλακα πορφυρέην, πολέας δ' ἐνέπασσεν ἀέθλους,

". . . . . and she was weaving a huge web, a twofold purple [veil or mantle], and sprinkling in [*i. e.* embroidering thereon] many contests."

† Plinii Hist. Nat. lib. viii. 74.

‡ Plin. *l. c.*

§ Martial. lib. xiv. epig. 150.

‖ *Ejusd.* lib. viii. epig. 28.

of other metals besides iron. *Acus sarcinatrix* was a bronze needle used by tailors in making clothes. The needles of Cyprus were most sought after.

I have been unable to observe any thing of the needles of historic Gaul with well-determined dates. Those of bone or of bronze that have been found at Alise, at Corent, or at Gergovia in Auvergne, date (according to the learned antiquary of Clermont, M. Matthieu) from an epoch anterior to the Roman Invasion. Those made of bone are of less perfect workmanship than our prehistoric specimens of needles made of Reindeer antler. Most of the Gaulish needles have the eye terminal, and round or oblong; but some have the hole for the thread pierced in a widened part in the upper third of the stem—thus resembling those in bronze, of which we here give a figure (fig. 49) supplied by M. Matthieu, and remarkable for the thinness of the shaft.

Fig. 49. Ancient Gaulish Bronze Needle, thin, with the eye near the middle. (M. Matthieu.)

Among the American nations who were civilized previously to their connexion with European nations, we may refer to the Mexicans, who, with considerably advanced notions of some arts, had not however any knowledge of the use of iron. We know that, when the Spaniards invaded Mexico, the barbers in the city had still to make use of thin-edged flakes of obsidian as razors, in shaving their customers &c. The art of sewing, however, was not unknown among the ancient Mexicans; and they had needles of bronze, according to Mr. E. B. Tylor*. The late Mr. Henry Christy's Collection contains some of these bronze specimens, which somewhat resemble in form and size our packing-needles.

"Among the ancient inhabitants of Peru," says Goguet†, "whom we must regard at all events as a highly enlightened and polished nation, neither needles nor pins were known; but long thorns were used in sewing and in fastening garments"‡; but this assertion of Goguet's is contradicted by an observation, lately made before the Anthropological Society of Paris, on an ancient Peruvian mummy having a *copper* needle still inserted in the linen of the envelope, and accompanied with a ball of thread§. For a know-

* Anahuac; or Mexico and the Mexicans, Ancient and Modern, p. 235, 8vo, London, 1861.

† De l'origine des lois, &c. Nouvelle édition, 3 vols. 8vo, Paris, 1809, vol. i. p. 136; and 6th edit., 8vo, 1820, vol. i. p. 142.

‡ "Hist. des Incas [de Garcilasso de la Véga; Traduite &c., 1715 and 1744], vol. ii. pp. 63, 77."

§ [Mr. David Forbes, F.R.S., has informed us that needles made of large strong Cactus spines are frequently found with the female mummies of Peru. Similar needles, in the Christy Collection, are nearly as strong as bone, and retain some of the sewing thread of hair (?). And a large *bronze* needle, retaining

ledge of this interesting fact I am indebted to my learned friends Dr. Broca and Dr. Pruner-Bey.

The earliest use of iron or steel needles in Europe that I have been able to learn any thing of was in connexion with the establishment of a manufactory of these kinds of sewing-needles at Nuremberg in the Fourteenth Century. They were known in France in 1540, and a little later in England, where they were introduced by Catherine Howard, wife of Henry the Eighth, but they were not sold till the reign of Mary, in 1555.

At the present day the use of these necessary implements of steel is almost universally spread abroad by European navigators and travellers supplying such ware to the more or less savage nations with whom they come into contact.

Needles of bone, or of Walrus ivory, were in common use among the Esquimaux of the Arctic regions when visited in the first quarter of this Century by Sir John Ross, who, writing of their garments, observes*, "the whole of these are made by women, the needles used being ivory [probably Walrus ivory], and the threads of the sinews of the Seal; the seams are so neat that they can scarcely be distinguished."

Fig. 50.
Esquimaux Needle of Bone.
(After Parry.)

A similar account is given by Captain Parry†, who says of the Esquimaux, "In some of the few arts practised by the women, there is much dexterity displayed, particularly in that important branch of a housewife's business, sewing, which, even with their own clumsy needles of bone, they perform with extraordinary neatness." The plate at the end of 'Parry's Second Voyage' (opposite p. 548) contains an illustration (fig. 11) of one of these bone needles, with its sinew thread; and we have reproduced it in our fig. 50 (Woodcut). It differs but little from those used by the Aborigines of Périgord, except that it is not so straight or so delicate as most of those figured in our B. Plate XVII.

As to the thread used by the Esquimaux in sewing skins together for garments, it appears, according to the reports of Ross and Parry, that it is usually made from the tendons of the Reindeer; and when these are wanting, they employ the entrails of a species of Seal.

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some woollen thread, from an ancient Peruvian grave, has lately been presented to the Christy Collection by the Rev. Saunderson Tennant.—Editor.]

* Voyage of Discovery &c., 1819, vol. i. p. 172.

† Parry's Second Voyage for the Discovery of a North-west Passage, 4to, 1824, p. 537.

We have long known also that the Laplanders use the tendons of the Reindeer in sewing their garments of skin. Olaüs Magnus*, who wrote about the middle of the Sixteenth Century, remarks, in speaking of Lapland, then but little known, "Nervi loco lini (ibidem ob frigora non crescentis) ad indumentorum usum, instar fili præparati, deputantur."

A century later Scheffer† gave an account of the manner of their preparing this thread, of which he mentions the coarse, fine, and very fine sorts, none of them, however, being very long.

This agrees well with the report of the poet Regnard, who visited that country in 1681, and says "the thread used by the Laps is made of Reindeer sinews; the finest is employed in sewing their garments, and the coarsest in fastening the planks of their canoes."

It is Linnæus, however, who has given the fullest details of the making and using of this thread‡; and we therefore transcribe the passages in full:—"They [the women] make their thread of the sinews in the legs of the Reindeer, separating them, while fresh, with their teeth, into slender strings, which they twist together" (vol. i. p. 133); and "The tendons in the legs of the Reindeer serve to make thread or cord. In each hind leg are two tendons, one before the other; in each fore leg one behind and two or three before it. The Laplanders lay hold of with their mouth, split, and moisten them, rubbing them from time to time with Reindeer marrow, preserved in bladders for that use, in order to render them as supple as possible. Each string is made sharp at both ends, and drawn through holes of various sizes in an instrument made on purpose (of wood or metal), to render it as fine and smooth as they can. Two such threads are then twisted together by means of the hand upon the thigh or knee. They are generally held with the left hand, and twisted with the right upon the left knee, proceeding downwards, the thread being moistened from time to time with saliva" (vol. ii. p. 25).

Neither Linné, Regnard, nor Scheffer, however, as far as I can find, have mentioned how the needles used by the Laps in their day were made. It is quite probable that they were of metal, possibly of steel, since in the above-cited passage from Linné there is mention made of an implement "of wood or *metal*"

* Olai Magni Historia de gentibus septentrionalibus earumque diversis statibus, &c., fol., Romæ, 1555, lib. xvii. cap. 30, p. 598; and Olai Magni gentium septentrionalium historiæ breviarium, 12mo, 1652, p. 443.

† Joannis Schefferi Argentoratensis Lapponia, &c., 1673, Frankfort, 4to, p. 262; 'Histoire de la Laponie,' traduction française, Paris, 1678, 4to, pp. 240, 241.

‡ Lachesis Lapponica; or a Tour in Lapland, now first published from the original MS. Journal of the celebrated Linnæus [translated by C. Troillius], by J. E. Smith, 2 vols. 8vo, London, 1811.

with which they prepared the thread. The North-Europeans seem to have been acquainted with the use of metals long before the American Esquimaux. Thus the Kamtschadale women who, towards the middle of the last century, used for sewing and embroidering sometimes vegetable thread, sometimes the sinews of quadrupeds, were provided with steel needles by the Russians, and at an earlier date got them from Japan*.

Captain Parry† furnishes also similar notices of the employment by the Esquimaux of thread made of Reindeer tendon; and he gives some very interesting details relating to their management of the needle, and the preparation to which they subject the skins intended to be sewn together for garments, probably to give greater facility to the passage of the needles, especially when these are of bone. He says:—"The thread they use is the sinew of the Reindeer (tooktoo ĕwālloo͡), or, when they cannot procure this, the swallow-pipe of the Neitick [a kind of Seal?]. This may be split into threads of different sizes, according to the nature of their work, and is certainly a most admirable material. In sewing, the point of the needle is entered and drawn through in a direction towards the body, and not from it or towards one side as with our seamstresses. They sew the Deer-skins with a 'round seam;' and the water-tight boots and shoes are 'stitched.' The latter is performed in a very adroit and efficacious manner, by putting the needle only half through the substance of one part of the Seal-skin, so as to leave no hole for admitting the water. To soften the Seal-skins of which the boots, shoes, and mittens are made, the women chew them an hour or two together, and the young girls are often seen employed in thus preparing the materials for their mothers." It can readily be conceived that this preparation would greatly facilitate the passage of a bone or ivory needle through the edges of two skins that have to be joined by sewing at the edge ("overcasting") or by stitching flat.

Now, if the reader looks at our B. Plate XVII., he will see in figs. 7–20 a series of fourteen needles of different sizes, and all pierced with an eye, or hole for threading. In the two longest (figs. 7 and 12) the top of the needle has broken off at the eye, the lower border of the perforation remaining. The longest specimens have been made of flakes detached by sawing from Reindeer antlers, and subsequently cut thin and round so as to taper to a point at one end, whilst the other is somewhat flattened and pierced with the hole for the passage of the

* Description de toutes les nations de l'Empire de Russie [par J. G. Georgi]; St. Petersburg, 3 tom. 1776, 4to; and 1797, 3me Collection, p. 86. See also 'Russia; or a compleat historical account of all the nations which compose that Empire,' 3 vols. 8vo, London, 1780, vol. iii. p. 150.

† *Loc. cit.*

thread. Figure 16 appears to have been made of a splinter taken from the shaft of a Bird's bone. Others, of medium size, must have been made from pieces cut out from the very compact bones of Herbivorous Mammals. Figure 3 in the same Plate shows the upper half of a metatarsal of Reindeer, having on its anterior face a long notch made by saw-cuts, visible on both its sides, by means of which it has been easy to remove from this very hard part of the bone long narrow pieces sufficiently thin to be worked into needles of very small size. The lower portion of a Horse's metacarpal, shown by fig. 13, also bears traces of sawing and longitudinal cuts, made with the same intention. Some Prehistoric Stations of the Reindeer Age have been cited as having yielded needles of ivory; but as yet, for our part, we do not know of any specimens consisting of that particular material.

The aforesaid needles of bony substance have nearly always rounded stems; and most usually they have been carefully polished. When they have not received this polish, it is possible with a lens to distinguish longitudinal striæ, that must have been produced by the finely broken edges of flint flakes, such as served to thin down and to point these little instruments, just as at the present day we use a piece of broken glass to shape and sharpen an awl of bone or hard wood. Perhaps the first polish was given to these bone needles by rubbing them on a piece of sandstone; and we have found several such examples, bearing straight and rather deep grooves, in which can be placed, as we ourselves have done, the partly reduced splinters of bone, which therein rapidly receive a rough polish by simple rubbing. We here figure (Woodcut, fig. 51) a piece of sandstone, with numerous grooves, which came from the Cave of Massat (Ariége), where, as is well known, M. Alfred Fontan, in the first place, and, subsequently, M. Garrigou have found needles of the same type as those figured in our B. Plate XVII. In A. Plate XXIX., among the Stone Implements, are represented three other

Fig. 51.

A piece of Sandstone that has served as a Rubber in making Needles; from Massat, Ariége*.

* [In the Christy Collection is a rounded piece of sandstone, about the size of the palm of the hand, bearing grooves made by rubbing small cylindrical objects on its surface, in different directions. It was obtained from an Indian mound, containing skeletons, near Appalachicola, in Florida. Polished stone celts, chipped arrow-heads, and small earthenware vases were obtained from the same mound, but neither needles nor piercers.—Editor.]

small furrowed slabs of this sandstone, which have served for the same purpose: these are from the Caves of Dordogne. As for the more polished and shining surface observable in some of the better-made specimens of Needles from the Dordogne Caves, it has been produced by friction, but probably with the aid of some fine sand or hard powder, such as is used for the like purpose at present in this kind of work.

The "eye," or hole for threading, in these Prehistoric Bone Needles has been usually hollowed out by the workman boring alternately, first on one side and then on the other, with a tool used as a drill.

In the attempts we have made to get a clear notion of the processes by which, in the absence of every kind of metal, the Aborigines of Périgord were able to manufacture such delicate implements, we have been tolerably successful in preparing, by the employment simply of flint flakes, the little rods of bone sufficiently thin to be fashioned as needles, and in scraping them with a splinter of flint to make them cylindrical and pointed; but when we tried to bore the hole for the "eye" in the thicker end, with some of the fine-pointed simple flint flakes so frequent in the Caves where such stone chips were abundantly made, the points always broke off at the first turn of the hand in the attempt. Luckily we had collected some rare specimens of flint flakes, one end of which, worked into little facets, somewhat like certain diamonds, terminated in an obtuse point; and by means of these shaped flakes, or little piercers, applied alternately to the two faces of the somewhat flattened head of the bone needle, and worked by a simple turn of the hand, we have made in fifteen minutes a perforation or "eye" exactly like those of the old needles of the Caves. Fitted to the end of a turner's or a locksmith's drill, one of these old piercers produced the same result in two or three minutes.

Fig. 52.
Flint Piercer from La Madelaine.

It is conceivable that the Cave-folk here had resort to some mechanical appliance in making their tools, and particularly their sewing-needles; for when these were unfit for use, from the breaking of the eye, they had ready means of making another perforation below the place of the first, as clearly seen in B. Plate XVII. fig. 16, in which the rough fracture of the thick end of the needle shows the trace of a former hole, below which the existing "eye" has been pierced.

We here figure also another needle (Woodcut, fig. 53), in which the relation of the second "eye" to the place of the first is still more evident. In another

Fig. 53.

Broken Needle, with a new Eye.

Fig. 54.

Broken Needle, with a new Eye partly made.

specimen (Woodcut, fig. 54) we see the commencement only of the new perforation, shown by the black dot, which was intended to be completely worked into a new "eye" to the broken needle.

So also when the point of a needle was broken, the Cave-folks proceeded to refit it for use, though shortened, as can well be seen in figs. 17–20 of B. Plate XVII. It is even easy to see in figs. 18 and 20 that, in the broken needles, the point has been made by means of simple longitudinal cuts, and the workman has not taken the trouble to make the point round by smoothing off the angles.

It has been thought by some that these needles made of bone and Reindeer antler, and so slight in the stem, could not have offered sufficient resistance to the necessary pressure for piercing skins joined edge on edge, and that really the perforations must have been made with an ordinary awl,—the needle only carrying the sewing-thread. But the operation thus conducted would have been more complicated, and quite as long as if the workman had simply employed the bodkin or the awl in use among shoemakers and harness-makers. We have also seen, in the detailed account which Captain Parry has given of the mode of sewing among the Esquimaux women (see above, p. 132), that, by means of a preparatory manipulation, they render the skins well suited for the direct use of their bone and ivory needles; and the seams are actually impermeable to water, so perfectly and ingeniously are they stitched together.

There are, however, among the specimens figured in B. Plate XVII., some very long and slender Needles (such as figs. 7–12) which it would be difficult to suppose could bear without breaking the pressure necessary to force such a needle

through two skins in process of being sewn together. The short Needles must have been far more appropriate for this kind of work, as, indeed, we see at the present day with tailors and sempstresses in sewing cloth and thick linen or cotton stuffs.

Among the ancients long and very slender needles, of which bronze examples have been met with, served probably for working embroidery or tapestry (*acus Phrygiæ*; *acus Babylonis*). May it not be necessary, therefore, to explain the use of the long needles among the Cave-folk of Périgord by supposing that their women had other handiwork with the needle besides the simple sewing of garments to cover the body and protect it from the rigours of the climate? Excepting this, we must admit that we have no foundation for supposing that these Aborigines had any notion of the use of textile vegetable matters in preparing tissues; for among the remains of their household industry there is not known at present any relic of the distaff, or of those loom-weights which are of frequent occurrence among the remains of the Lake-habitations of Switzerland and also in other Stations of that more recent age when a knowledge of the art of weaving coarse stuffs of linen thread had grown up.

Scheffer, whom we have already had occasion to cite, mentions also, in his 'History of Lapland,' that the Lap women are very prodigal of embroidered ornament, not only on their own clothing, but also on various little articles of everyday use to which the ornament can be applied—as, for instance, the sledge-harness of the Reindeers. It is, however, in the embroidering of bands for different parts of their garments that they especially excel.

The same love for ornaments of needlework shows itself among the Esquimaux women. The Danish Missionary, Hans Egede, who in the beginning of the Eighteenth Century had sojourned many years among the aboriginal Greenlanders, gives the following details respecting the women's toilet*:—"Next the body they wear a waistcoat made of young fawns' skins, with the hairy side inwards. The coat, or upper garment, is also made of fine coloured swans' skins (or, in defect of that, of seal skins) trimmed and edged with white, and nicely wrought in the seams and about the brim, which looks very well."

In the third volume of the 'Description of all the Nations of the Russian Empire,' cited above (p. 132), are given details, of a similar kind, respecting the costumes of the inhabitants of some islands of Behring Straits, to the east of Kamtschatka, and belonging to the Aleutian group. At the time when the account was written

* A Description of Greenland &c. By M. Hans Egede. Translated from the Danish. 8vo, London, 1745, p. 131.

(1777) "these islanders lived in holes which they had hollowed out for themselves in the ground. They possessed no domestic animal, not even the dog; and they had nothing but stone and bone as the materials for arms and household implements: they lived on fish and the flesh of such quadrupeds as they could take by hunting, and the remains of which, accumulated in their subterranean habitations, exhaled a strong odour: their clothing was made of the skins of different animals and sewn with thread made of sinew. Nevertheless the women displayed an extreme coquetry in some of the details of their attire. Their out-door garments were composed of the belly-skin of different birds; and, though they had but a poor knowledge of the art of tanning, they were very adroit sempstresses; and the borders of their robes or dresses were very prettily embroidered. They also applied embroidered bands to their caps made of the skins of the Grebe and Diver. These embroiderings were very ingenious. They were made with fish-bones, which served for needles, and with sinews of quadrupeds, which they know how to split and prepare as thread"*.

Thus, among this people, having no flocks to supply them with wool for their garments—deprived too of textile plants such as could be converted into thread—the instinct of coquetry still showed itself in the luxury of embroideries, which the women were reduced to execute with fish-bones for needles, and sinews for thread.

Judging, then, by what we have found in their household works of arts, the women of the Prehistoric Aborigines of Périgord, in the Reindeer Age, must have had more advantages, at least in some points of view; and their needles, various in size and form, sufficiently denote that they could use them for handi-work of divers kinds.

If, now, the reader looks at fig. 6, in B. Plate XVII., he will observe on an Implement made of Reindeer Antler, and unfortunately broken at both ends, the engraved outline of an object which appears to us to be a human hand, with slender and somewhat over-long fingers. There remain only four fingers and a portion of the upper metacarpal surface, behind which we can recognize a series of chevrons or lines broken at a recurrent angle. At first sight these chevron lines might be taken for marks of tattooing, such as are still in our own times made on this part of the forearm among some savages. The figured specimen, however, does not show any contraction behind the hand, where the wrist should be; and therefore we are led to suppose that this part is covered, as far as the back of the hand, by a garment or sleeve ornamented with embroidery or with

* See also 'Russia' &c., 3 vols. 8vo, London, 1780, vol. iii. pp. 209–213.

such attached bands as Scheffer describes as being very frequently used for ornament by the women of Lapland.

As for the thread used in sewing or in embroidery by the aborigines of Périgord, we have on several occasions* had to notice on certain Reindeer bones particular marks indicative of the tendons of this animal having been used for some purpose; and what we know of the use made of them among the Laplanders, the Esquimaux, and other modern nations authorizes us to conclude that the old Périgord people, living under like circumstances, employed them in a similar way.

In fig. 2 of B. Plate XVII., showing the posterior face of the lower end of a metacarpal bone of the Reindeer, there are above the left condyle, at *a*, two marks, or little notches, which can be explained only as having been made by the sharp edge of the instrument used at this point in cutting away the flexor tendon. In fig. 4 also of the same Plate, representing a cubo-scaphoid of the hock of the Reindeer, we notice some similar notches that have been made on the front face of the bone, on the course of the tendons. It is not rare to find these bones of the Reindeer bearing the same significative marks—though, as it is easy to understand, they could only have been produced when the pressure of the instrument cutting the tendon has been sufficiently great to penetrate even to the bone. We may remark, however, that up to the present time we have not observed such notches or analogous marks on the metacarpals or metatarsals either of the Aurochs or of the Horse.

All tends to make us admit that, like the Laplanders and Esquimaux of the present day, the ancient Cave-folk of Périgord must have used the tendons of the Reindeer in sewing their clothes that were made of skins; and, as the needles of those primitive times vary considerably in form and dimensions, it may well be assumed that they also knew at that time how to split the tendons and make them into threads of different degrees of fineness, so that they could be used for different kinds of needle-work.

Scheffer† tells us that, in his time, the Lapland women did not spin flax (which, indeed, as Olaus Magnus remarks‡, could not grow in so cold a climate), but they knew how to make thread with the wool of their Sheep, and also with Hare's fur; and with the latter they knitted caps, as soft as the down of the Swan's neck, and wonderfully warm§.

* 'Comptes Rendus,' vol. lviii. p. 407; "Cavernes du Périgord," p. 33, in the 'Revue Archéologique,' March 1864 &c. † *Op. cit.* ‡ *Op. cit.*

§ Pliny also refers to garments having been made of hare (and rabbit?) fur, 'Nat. Hist.' lib. viii. § 81 (55).

Our Aborigines of the Reindeer Period, however, had no Sheep, and probably did not know this animal even in the wild state (we have not found any bones of this genus in the hearth-stuffs or refuse-heaps); but the bones of the Hare and Rabbit are not very rare in the caves formerly inhabited in Périgord; and the usually unbroken state of these bones may imply that the flesh of these animals did not serve for food to the cave-dwellers. Besides, it is known that a reluctance to eat the flesh of Hare and Rabbit, general enough in ancient times, still exists among some nations of modern Europe; and it may be that in hunting the Hare and Rabbit the people of the Reindeer Age had no other object than to procure the furs of these animals for making clothes, or, if we were to propose another assimilation with the habits of the Laplanders, for using the spun hair of their fur.

We have represented in figs. 5, 21, and 22, of B. Plate XVII., three tools of Reindeer antler, having one extremity truncated, the other cut across with shallow notches and ending in a blunt point. In endeavouring to explain the probable use of these little implements, it was at first thought that they might be some kind of crochet-hook, for making thread, or for knitting with very large meshes; but since these three specimens were drawn, other similar specimens have been found quite perfect, with a somewhat sharp point, which is wanting in these figured specimens. Hence they who at first were disposed to consider them knitting hooks would now be inclined to regard them as points of barbless arrows, intended to be fastened to the shaft with a ligature in the notches of the lower end. With these different interpretations, we still leave them in some uncertainty.

Before ending this detailed account of the art of sewing among the Aborigines of the Reindeer Period, I must state that the eyed needles were not found indifferently in all the Stations of that Period.

In Dordogne, it is at Les Eyzies, at Laugerie Basse, and at La Madelaine that the largest quantity of Needles of this form have been collected, and always in company with Harpoon-heads of the barbed type. It is also with these barbed weapon-heads that similar Needles have been found in the Bruniquel Cave, by M. De Lastie, and in the rock-shelters of the same place, so successfully explored by M. Brun of Montauban. One of those eyed needles had been discovered in 1852 by M. Alfred Fontan, who was kind enough to intrust it to me for illustration in the 'Annales des Sciences Naturelles' in 1861*. M. Fontan found it in the lower cave of Massat (Ariége), where it was associated with the barbed weapon-heads. Since that time, other Needles, with barbed harpoons, have been

* Ann. des Sc. Nat. 4me série, Zoologie, vol. xv. 1861, p. 251, pl. 13. fig. 4.

obtained by M. Garrigou from that cave of Massat: they were exhibited in the Exhibition of the History of Labour at Paris in 1867.

The cave of Lourdes (Hautes Pyrénées), containing many remains of the Reindeer, has furnished only two coarse Needles, having an oblong head and eye, not pierced by boring, but rather by cutting with a sharp instrument. One of these needles has been illustrated by M. Alphonse Milne-Edwards, in his note on the works of man found in this cave of Lourdes*. The eye of this coarse needle is broken half off, as shown in the illustration referred to.

In the cave of Veyrier, at the foot of Mount Salève, which belongs, like those of Les Eyzies, La Madelaine, Laugerie Basse, &c., to the artistic portion of the Reindeer Period, and where have been found antlers of this ruminant on which some figures of animals and plants are engraved, MM. Alphonse Favre† and Thioly‡ have noticed the discovery of Sewing-needles, one of which, according to M. Thioly, seems to be of ivory.

In the cavern of Aurignac (Haute Garonne), however, in that of Les Fées (Allier), and at the station of the Gorge d'Enfer, where the remains of the Reindeer are less abundant, and at the same time the Quaternary fauna is more completely represented by extinct species, the eyed Needles have not as yet been met with. They seem to be represented by simple awls, made of bone, or perhaps of ivory. We may add that in the Stations above named the probably older *lanceolate* weapon-heads occur in place of those of the *barbed* type (see above, p. 94, and p. 95).

We know that eyed needles of bone have been discovered in several of the ancient lacustrine habitations in Switzerland. M. Delfortrie has noticed some in a Station (of the Polished-Stone Period) which he has explored, even in the town of Bordeaux; and we must remember that a considerable number have been found at the Gaulish Stations of Alise, Corent, and Gergovia in Auvergne. But in general these needles, though belonging to times comparatively more recent, are far from being as well shaped as those of the Artistic Epoch of the Reindeer Age.

It may well be supposed that, in the same region of Asia where the art of embroidery in historic times was carried to high perfection, the use of the *acus Phrygiæ* and the *acus Babylonis* (see above, p. 128) must in more remote antiquity

* "De l'existence de l'homme pendant la période quaternaire dans la grotte de Lourdes," &c., 'Ann. des Sc. Nat.' 4me série, Zoologie, vol. xvii. 1862, p. 243, pl. 6. fig. 3.

† 'Station de l'homme de l'âge de la pierre à Veyrier, près de Genève,' 1868.

‡ 'L'Époque du Renne au pied du mont Salève,' 1868.

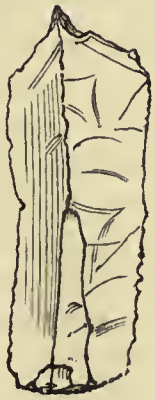
have been preceded by the use of bone needles. When, in 1863, at the end of his expedition to the Dead Sea, the late Duc de Luynes visited (at Beth-Saour) the collection of worked flints and other very ancient objects collected by M. le Curé Moretain in the neighbourhood of Bethlehem, he noticed a bone sewing-needle, having a pierced eye, but broken at the point. M. Louis Lartet, who accompanied the Duke, asked permission to draw it; and hence I am enabled to satisfy myself that this needle is exactly similar to those found in our Stations of the Reindeer Period in Périgord.

Fig. 55.

A small Awl or Needle-piercer, from Mentone, North Italy.

Fig. 56.

A small Awl or Needle-piercer, from Les Eyzies, Dordogne.



XII.

REMARKS ON THE REINDEER. By ALEXANDER C. ANDERSON, Esq.

(In a Letter dated November 20, 1868, Rosebank, Victoria, Vancouver's Island.)

THE following observations are connected with the Notes upon my former communication, *suprà*, pages 55–57. As I consider the establishment of the identity of the Reindeer with the description given by Cæsar to be a point of great importance in the furtherance of your investigations, I must ask indulgence for the remarks here offered, as a necessary pendant to my former letter.

With reference to *Note* 7, page 55.—The authority of Sallust will, I apprehend, go but a small way to solve the apparent difficulty, since probably from that very authority all subsequent misapprehensions on the subject have arisen. His words ("Germani intectum rhenonibus corpus tegunt")* stand an isolated passage among the fragments of the missing historical books. It is possible that the context, had it been preserved, might have conveyed intimation of the true meaning of the foreign word which he introduces, apparently for the first time in its adapted sense, to his Roman readers; but in the absence of such explanation it is permissible to suppose that he uses the word in this concise form to avoid a long periphrasis. Be this as it may, Sallust, the contemporary of Cæsar, and writing soon after his death, could have derived his information only from the words of Cæsar, the sole original authority. To revert, then, to the text: the passage is so clear that it can, I submit, admit of no questionable reading. Amplifying it somewhat in order to its due apprehension, it reads thus:—"pellibus rhenonum, aut parvis tegumentis de pellibus rhenonum consutis, utuntur," &c. "They wear the skins of [certain animals called] Rhenones, or scanty garments [composed] of the skins of those animals." When the Rheno became scarce in after times the skins of other animals were necessarily employed as a substitute; and foreign writers, having once adopted the term "rhenones" to signify such garments, might still continue to do so notwithstanding the change of material,—this the more readily, since the original derivation of the word seems to have been entirely overlooked. The modern languages present many instances of a similar kind. The defensive armour, originally made of leather, for instance, is still called a *cuirass*, notwith-

* Sallustii Historiarum Incert. Lib. Fragmenta (Editio Crispini in usum Delphini, Lond. 1793).

standing the widely different material of which it is now composed. From the first, however, this word "Rheno" (so rarely occurring in original authorities) seems to have been a *crux* to commentators. Varro, 'De Linguâ Latinâ,' lib. iv. (I cite the "Delphin" annotators), states it to be a word of Gallic origin ("rhenonem esse ait vocem Gallicam"), apparently to guard against the misconstructions which, we may infer, had even then arisen. Not to appeal to my own experience, I will quote from Sir Alexander Mackenzie a description of the garment formed of the Reindeer skin, such, though more ample in its proportions, as Cæsar probably intended. Speaking of the dress of the Chipewyans, he says:—"In the winter it is composed of the skins of Deer* and their fawns, and dressed as fine as chamois leather, in the hair. In the summer their apparel is the same, except that it is prepared without the hair . . . . The shirt or coat when girded round the waist reaches to the middle of the thigh . . . . A ruff or tippet surrounds the neck; and the skin of the head forms a curious kind of cap. A robe made of several deer- or fawn-skins covers the whole. The dress is worn single or double, but always, in the winter, with the hair within and without" †.

From his omission to supply the name, as he was careful to do in his other descriptions, it is evident that Cæsar, in describing the particular animal under consideration, was dubious of its identity with that of whose skin he had already spoken. Yet the mere fact of this omission might be argued to prove that he at least suspected that identity. It is to be remembered that he obtained his descriptions, under the most favourable assumption, at second hand, and probably through interpreters very inadequate where nice discrimination was required. Hence whatever inaccuracies he may have been led into; and of these inaccuracies we have a notable example in the absurd description of the Elk, immediately succeeding. As aptly suggested by Mr. Dawkins in the quotation given at page 55, a rude profile sketch, rather than, as supposed by me, the view of a single antler, may have led to the notion of the *Unicorn*—a fabulous creature whose existence was long firmly believed. Apart from this the description is singularly apt, even to the possession of the antler by both sexes, unlike the other *Cervidæ*. This peculiarity alone might have caused Cæsar to hesitate to call the animal a *Deer*,

* Mackenzie here refers to the Caribou or Reindeer, whose skin is preferred for the closeness of its texture, its thick coating of hair, and consequent warmth. It is to be borne in mind that the garments described are adapted for a climate whose ordinary winter temperature is from 20° to 40° below the zero of Fahrenheit. They afford perfect protection against the cold. The *voyageurs* call them "robes de caribou," or briefly "cariboux."

† Travels of Sir A. Mackenzie, 8vo Edit., Lond. 1802, p. 148.

and induced him to style it rather "a kind of ox having the shape of a deer;" but the mention of this attribute, peculiarly distinctive of the Reindeer among other varieties of the genus, establishes the reality of his description, and proves that that animal alone could have been intended.

That such is the case, were other evidence wanting, the recent discoveries in Dordogne, relics of an anterior age, I think conclusively prove—conclusively, even without the important evidence of the name incidentally quoted by Cæsar, and preserved to our day in the Teutonic Renn-Thier, the French Renne, our own Reindeer, and almost literally in the Spanish Réno. The etymology of the name as given by Mr. Dawkins, unlike many fanciful etymologies of the present day, has an obvious air of correctness. I might suggest, however, that the term originated not in the absolute powers of speed, relatively considered, but rather in the far-running tendencies of the animal. Gregarious in their habits, and by nature migratory, a herd, when once fairly alarmed, seeks instinctively a distant place of refuge. This is characteristic at least of the American Reindeer; and I have myself in days of yore, while hunting in the remote interior of British Columbia, pursued a retreating herd, affrighted by the recent attack of a Carcajou*, more than a hard day's march on the snowshoe—a persistent retreat, unlike the capricious flight of other varieties of the genus.

With reference to *Notes* 9 and 10, page 56.—We have, I think, notable proof of the Reindeer having retreated northward by gradual stages in the fact that, evidence being adduced of their having existed in Dordogne at an earlier day, they were not found south of the Hercynian forest at the period when Cæsar wrote. Their residence in Dordogne, too, was doubtless *permanent* [see M. Lartet's Note A, further on], as far as the idea of permanency can be attached to these animals, whose habits, from known natural causes, are essentially migratory. Thus the low swampy lands around Hudson's Bay and towards Lake Winipic, abounding in lichens for their winter sustenance, and at that season their natural habitat, are quite unfitted for their summer residence, owing to innumerable flies. Hence their periodical migration towards the snows of Labrador on the one hand, and towards the Arctic confines on the other. Even in a domesticated state, among the Laplanders &c., this exigency of their nature has to be sedulously attended to. It was to this cause that the failure of Lord Selkirk's experiment†, to which

* The Wolverine (*Taxus gulo* of Cuvier), a formidable enemy to the Reindeer, and indeed a general mischief-maker.

† The Earl of Selkirk selected for his nursery the spot at the effluence of Lake Winipic, known as the

I have before alluded (p. 48), was chiefly, if not entirely, attributable—the want, namely, of adjacent mountains to which the herds might be driven in summer.

As regards the ancient climate of the Continent, all classical authority goes, I think, to prove that the variation of temperature was far greater than it now is—consequently more congenial with the nature of the Reindeer. This admitted, much of what might otherwise seem improbable is at once removed. Juvenal (Sat. vi.) speaks of the freezing of the Tiber quite as a common occurrence:—

> "Hibernum fractâ glacie descendet in amnem,
> Ter matutino Tiberi mergetur, et ipsis
> Vorticibus timidum caput abluet."

Horace in his 'Odes' makes frequent allusion to the severe cold, not exceptionally, but as an ordinary condition of the winter. Witness the opening of Ode ix. lib. 1:—

> "Vides, ut altâ stet nive candidum
> Soracte, nec jam sustineant onus
> Sylvæ laborantes, geluque
> Flumina constiterint acuto?"

Ovid (Tristia, lib. iii. eleg. x.), speaking of his place of exile on the Euxine, says:—

> "Vidimus ingentem glacie consistere pontem,
> Lubricaque immotas testa premebat aquas.
> Nec vidisse sat est: durum calcavimus æquor:"

and throughout the same books he speaks of the climate in terms which in these days would apply only to that of a hyperborean region. Receding from the Augustan era the Roman annals are quoted as recording an intense frost in

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site of "Old Norway House"—so named from the Norwegian experts stationed there to conduct the experiment. The date, I think, 1812.

On my last visit to York Factory in Hudson's Bay, in the summer of 1842, it was mentioned to me that the customary supply of Reindeer for the use of the Post was then procured with more difficulty than before. The ancient Pass, where the fence for driving the deer during their periodical migrations had long stood, had become gradually less frequented, doubtless through long-continued molestation of the migrating herds, many of which had evidently sought more remote and less disturbed lines of transit. Hearne, in his 'Travels,' gives, I think, a description of the method of driving the deer adopted by the natives—a method both simple and efficacious. That the ancient Cave-dwellers practised some such device to the same end, under the inference that primitive races will arrive under similar circumstances at nearly similar conclusions, I do not question. Some of the tracings on B. Plate II., and especially those in fig. 7, are, I think, corroborative of this assumption.

A.U.C. 480, when the Tiber was frozen and the ground covered with snow for a period of forty days. Throughout, by ancient writers, the climate of Gaul is described as extremely inclement—sometimes, indeed, in terms obviously exaggerated. The limited resources of my private shelves, however, to which alone I can make reference, do not permit me to pursue this subject further. It has, I believe, been amply treated by Hume in his 'Essay on the Populousness of Ancient Europe,' and by other authorities. Withal, making every allowance for probable exaggeration, the weight of evidence is in favour of the conclusion that the winter climate of Europe has become much less severe. Whether this change be due, as is asserted to be the case in Upper Canada, to the clearing and subsequent draining of large tracts of land in the progress of agriculture, or whether, with the lapse of time, to more recondite causes, is a question I do not profess to decide; but naturally, in a choice of difficulties, one is disposed to accept the more obvious explication.

While advocating, then, a solution of the interesting question before us reconcilable with modern analogies, and consistent with the partial enlightenment afforded by anciently recorded facts, I shall, I trust, be pardoned if I venture to submit that the existence of the Reindeer, and that of some of the other fossil animals, such as the Hippopotamus incidentally mentioned, must be referred to widely different epochs [see M. Lartet's Note B, further on]—that they could not, in the recognized order of Nature, have been coexistent. The presence of the one it is easy to realize as of comparatively modern date, without presupposing any material change in the world's condition: easy, again, for the imagination, travelling backwards, to repeople the now smiling fields of Gaul with a nomadic race, primitive in habits, and deriving a precarious subsistence from the spoils of the chase, of which the relics, with other rude vestiges of human occupancy, are displayed before us. It is to my conception as a thing of yesterday in the great Kalendar of ages—remote, indeed, but realizable to the mind without inferring those vast climatic changes inseparable from the consideration, with reference to geographical distribution, of the Fauna of the remote geologic periods.

XIII.

NOTES ON THE REINDEER AND HIPPOPOTAMUS. By M. E. Lartet.

Note A (see above, page 144).—We have already often observed that by the examination of the many antlers of Reindeer collected in our caves, and evidently derived from individuals which had been eaten there, we are led to the conclusion that these animals have been slain of all ages, and consequently at all seasons. Thus, among the antlers still adhering to the frontal bones of skulls broken open to get at the brains, there were some not more than fifteen days old (with the Reindeer the antlers begin to show at a much earlier date than in other Deer); we have found also antlers of every stage of development, and, lastly, remains of skulls belonging to individuals that were shedding their antlers.

As for the permanency of the Reindeer in our low plains of Périgord, it may be explained (as we have sought to establish elsewhere) by the probability that the summers at that time were cooler in this part of our continent, then surrounded by colder seas. We see moreover that the Ibex, the Chamois, and the Musk-ox also lived on our plains, as well as Marmots, families of which were established as far as our north-western districts (Calvados, the Two Sèvres, &c.).

Note B (see above, page 146).—If we were to refer the existence of the Reindeer and Hippopotamus respectively to epochs very distant from each other, we should be obliged to renounce the establishment of the biological synchronism of our Quaternary Mammalia according to the collocation of their remains accumulated in one and the same deposit.

In England remains of Hippopotamus have been found in at least four caverns and in many river-deposits (at Bedford, for instance) with the Reindeer and *Elephas primigenius*. In France we have found the Hippopotamus in only one cavern, that of Arcy, where it was noticed by the Engineer Bonnard, who placed the specimens in our Museum of Natural History. De Vibraye found afterwards, in the same cavern of Arcy, numerous remains of Reindeer, accompanied by worked flint,—and in the lowest layer a human jaw, associated with numerous remains of the great Bear, the Elephant, Rhinoceros, and Hyæna. We have received from St. Acheul and other places on the Somme, remains of Hippopotamus and Reindeer found in the same deposit. The "diluvial" beds of the

Seine even in Paris, at Joinville, Montreuil, Grenelle, and Levallois have furnished some teeth and other remains of Hippopotamus; and at Levallois these remains were found in company with those of the Reindeer, of three Rhinoceroses, and two Elephants, and with numerous worked flints. At Viry Noureuil (Aisne) the Hippopotamus is also found with some worked flints, and associated with two Elephants, the Hyæna, Reindeer, and Musk-ox.

The lowering of the level of the perpetual snow-line and the wide extension of the glaciers do not, as I have said elsewhere, at all imply an excessive cold. In the Southern Island of New Zealand, where the glaciers come down nearly to the sea, and where a subtropical vegetation is developed quite near these glaciers, the Hippopotamus would acclimatize itself very well if there were large rivers such as our Seine was in the Quaternary Period, when its bed, according to the demonstrative works of M. Belgrand, was about 4 kilomètres (4370 yards) in breadth. Our Quaternary flora, according to recent studies, and the usual commingling, in our fluviatile drift, of bones of mammals of arctic character with those of species analogous to certain of our existing intertropical types, would denote, as has been very well said by M. de Saporta, a damp and warm climate, with variations of temperature less extreme than those noticed by the ancient authors quoted by Mr. Anderson.

What especially strikes and preoccupies the mind is the great development of the glaciers and the probable abundance of snow during the Period termed "Glacial." It is, however, in most cases, the ice and snow that act as preservatives against extreme cold. In our mean latitudes there are many plants perfectly preserved beneath the snow and ice, which would infallibly perish if they were exposed to the effects of the prolonged radiation during the clear quiet nights of winter. There are some districts in Siberia where neither rain nor snow fall during the winter, and where, during the long serene nights, the temperature on a level with the soil is lowered to 50° (Centigrade) below zero. There is no organized nature which could resist such an excess of cold; while most of the plants and animals are perfectly preserved under the shelter of ice and snow.

As to the contemporary existence, in Western Europe, of the Reindeer, Musk-ox (*Ovibos moschatus*), Hippopotamus, and certain Rhinoceroses, I must refer to what I have said in the 'Annales des Sciences Naturelles,' série 5me, Zoologie, 1867, vol. viii. pp. 189–193. The passage runs thus:—

"In concluding this sketch of *Rhinoceros Merkii*, a few words may be added on the geographical distribution of that species during the several phases of its existence.

"In England, the remains of this species have been observed principally in the Quaternary Gravels of the Thames, and in the caverns in some of the Southern Counties.

"In France, its remains occur in formations regarded as belonging to the early Pliocene (the fluvio-marine sands of Montpellier). They have also been met with in the Quaternary Alluvium of various valleys, and, though more rarely, in caverns.

"The age of the deposits yielding *Rh. Merkii* in Germany (in Baden and Würtemberg) is not quite ascertained.

"In Italy, this species is met with in the Pliocene strata of the Plaisantin, the Milanais, and Tuscany. It has also been found in an evidently Postpliocene formation near Rome.

"In Spain, it is only in caverns that some molars of *Rh. Merkii* have been collected. So also in Northern Africa, sufficiently characterized fragments of molars have been obtained from a cave near Algiers. These relics were buried with the remains of Elephants (*Elephas africanus*?), of Phacochœre, of Hyæna (*H. spelæa*? or *crocuta*?), of Panther, Porcupine, &c.; and among them human remains have been discovered, together with flints evidently chipped by the hand of Man*.

"As far as at present known, the habitat of *Rhinoceros Merkii* was limited between 36° and 51° of north latitude, with an extension of 17° of longitude. This is almost the geographical area, in the two directions, which appears to have been occupied by *Rh. leptorhinus* and *Rh. etruscus*, which have also been observed in England, France, Rhenish Germany, and in Spain; but it is much less than that overrun by *Rh. tichorhinus*, which had a distribution over more than 30 degrees of latitude, from the northern slope of the Pyrenees up to the 72nd parallel in Siberia, and over nearly 130 degrees of longitude.

"It is well known, from the observations of Pallas, that *Rh. tichorhinus*, coated with fur of great thickness, was, like *Elephas primigenius*, able to support the rigorous cold of the polar regions. It has been presumed that the same conditions did not exist with *Rhinoceros Merkii* and its contemporary congeners *Rh. leptorhinus* and *Rh. etruscus*, the fossil remains of which have not yet been observed further north than the 51st degree of latitude. This is also the limit of the fossil *Hippopotamus*.

"Indeed we know that the remains of two of these Rhinoceroses (*Rh. leptorhinus* and *Rh. Merkii*) have been found, in the Pliocene Sands of Montpellier,

* "M. Renou, 'Géologie de l'Algérie,' pp. 81–83."

associated with those of a Mastodon and two Apes (*Semnopithecus monspessulanus* and *Macacus priscus*, Gerv.), with which they were contemporary. The presence of Apes, always incapable of being acclimatized in cold regions, necessarily implies, for the epoch when this commingled fauna lived on the Pliocene coast of the Mediterranean, conditions of a higher temperature than that of our cooler climates.

"Nevertheless it has transpired that at a certain epoch of the following or Quaternary Period the same species of Rhinoceros, as well as the Hippopotamus, dating like them from the Pliocene Period, must have met together, existing in different parts of Central Europe with the Elephant (*Elephas primigenius*) and the shaggy Rhinoceros (*Rh. tichorhinus*), seeing that their remains are found imbedded pell-mell in the same deposits. We have to add that the Reindeer and Musk-ox (*Ovibos moschatus*) also have left their remains with them.

"To explain, however, how the Reindeer and Musk-ox were enabled to exist in Europe in the Glacial or Quaternary Period, side by side with the Hippopotamus and Rhinoceros, previously contemporaries of the Pliocene Apes, we are led to disallow much of the supposed rigours of the Glacial Period, the climate of which was probably marked by varieties much less extreme than those of the actual climate of modern times. In a word, it necessitates cooler summers for the Reindeer and Musk-ox, and, on the other hand, milder winters for the Hippopotamus and other species whose analogues have retired towards the tropical regions.

"Similar conditions of temperature are by no means incompatible with the great extension attributed to the Quaternary glaciers. We meet with their realization in certain parts of the globe, particularly in mean latitudes. Thus in Chile, according to Mr. Darwin, at 38° south latitude the glaciers of the Andes descend to the sea-shore opposite the Island of Chiloe.

"In the Southern Island of New Zealand, where perpetual snow exists at an altitude of scarcely more than 2000 mètres, the glaciers extend down to within some hundred mètres from the shore; and the savants attached to the Novara Expedition testify that in proximity to those glaciers there exists a forest vegetation of tropical physiognomy—Palms and Tree-ferns abounding. It has been remarked* that in certain parts of that island the difference between winter and summer can scarcely be distinguished.

"It may be said that there it is the property of certain littoral or insular climates. But, in the opinion of most of our geologists, at the very moment of the greatest development of the glacial phenomenon in Europe, vast tracts of

* "Chapman's 'New Zealand Almanack' for 1867, p. 57."

that which to-day constitutes our continent were covered by the then existing seas, the limits of which are nearly everywhere indicated by the great Erratic Formation. What was not quite submerged probably formed no more than a large archipelago, with perhaps certain peninsulas. Hence we can realize for that period all the advantages possessed by marine climates under mean latitudes.

"This hypothesis, which attributes to the Europe of the glacial period a climate milder, and less excessive in its extremes, than that which to-day favours our so-called temperate regions, will be accepted with difficulty by those geologists or palæontologists who have assumed that many of the great Quaternary Mammals must have perished by reason of the extreme cold.

"We may note that the majority of those Mammals which are now accepted as characteristic of the Quaternary Period (that is to say, *Elephas primigenius*, *Hippopotamus major*, three of the above-mentioned Rhinoceroses, &c.), and which appear to have retired before the epoch of the greatest extension of the glacial conditions in Europe, must have weathered that supposed climacteric safe and sound. In fact, their remains have very often been found in gravel and alluvium of valley-bottoms, as well as in cave-deposits, attested by the majority of geologists as more recent than the great Northern Erratics.

"It will be more rational, it seems to us, to suppose that after the retreat of the Glacial sea, and from the period when Europe, thus enlarged, recovered a continental climate, the increased heat of the summers forced the Reindeer and Musk-ox to migrate towards arctic latitudes, more in consonance with the requirements of their temperaments. The Chamois, Ibex, and Marmot, for the same cause, ceased to inhabit the plains of Central France and took refuge on the tops of the Alps and Pyrenees. On the other hand, the disappearance or extinction of the Hippopotamus, of certain species of Rhinoceros, and of the great Carnivores, whose congeners have migrated towards tropical regions, may have been caused by the coldness of our winters having become too excessive for the exigencies of their organization.

"We conclude with a remark having particular reference to the fossil fauna of caverns in South-eastern France. It has been seen* that, in the Maritime Alps, the Mars† cavern failed to yield to M. Bourguignat any remains of Reindeer; the absence also of that animal from the cave of Rigabe (Var) has been verified by M. Marion‡; and the fact is not to be lost sight of that the Reindeer does not

* In the earlier part of this Memoir by M. Lartet, 'Ann. Sc. Nat.' sér. 5, Zoologie, vol. viii. p. 158.

† "So called after M. Mars, the proprietor."

‡ "Premières observations sur l'ancienneté de l'Homme dans les Bouches-du-Rhône: 1867."

figure among the numerous Herbivores of the caverns of Lunel-Viel (Hérault), described by MM. Marcel de Serres, Dubreuil, and Jeanjean*. In opposition, however, to these negative coincidences, each of those three caves contains remains of *Rhinoceros Merkii*, the sole species of the genus which has been there observed up to the present time. It is well known that *Rh. Merkii* existed in that district of France from the earliest part of the Pliocene Period; for fragments, sufficiently characteristic, have been collected in the fluvio-marine sands of Montpellier, where they were mixed with remains of Mastodons, Apes, and other Mammals of the same epoch.

"Now what can be inferred from the absence of Reindeer from these south-eastern caverns? Must it be believed that, at that ancient epoch, this part of the Mediterranean coast was, as at present, favoured by an exceptional climate, too warm to allow of the existence of Reindeer? Or would it be better to suppose that the infilling of these caverns, that of Mars for example, which M. Bourguignat calculates to have taken place in his 'fifth epoch,' was in reality anterior in date to the appearance of Reindeer in Quaternary Europe? Let us hope that M. Bourguignat's further researches in this Mars cavern will supply him with more complete materials to elucidate the question from the one or the other point of view."

* "Recherches sur les ossements humatiles des cavernes de Lunel-Viel: 1834."

XIV.

FURTHER REMARKS ON THE REINDEER; AND ON ITS ASSUMED COEXISTENCE WITH THE HIPPOPOTAMUS. By A. C. Anderson, Esq.

(In a Letter dated December 10, 1870, Rosebank, Victoria, Vancouver's Island, British Columbia.)

I have perused with much interest the annotations by M. E. Lartet upon my paper of November 1868 [see above, page 147], having relation to subjects treated of generally in the 'Reliquiæ Aquitanicæ,' and more particularly in my previous contribution at pages 37–57. I must crave indulgence while I venture to state some of the grounds, at least, upon which are founded my dissent from the conclusions to which the arguments of M. Lartet tend—premising that I do so in no dogmatic spirit, but solely to elicit, as far as may be practicable, the true relations of a question having a bearing of deeper significance than the mere points at issue, of which the decision may appear to be in itself of comparatively trivial importance.

With reference, first, to my remark that animals so diversely constituted as the Reindeer and the Hippopotamus could not have coexisted under similar circumstances, it would, I submit, be illogical to assume that the existing races of animals, whether under supposed processes of acclimatization or otherwise, have changed in any degree their relative conditions. All written evidence goes to show that, where unchanged by the effects of domestication, the different genera retain now their pristine characteristics. The habits of divers known Birds and other animals, as described in the writings of antiquity, and especially in one of the oldest known records, the "Book of Job," are unaltered. Among the Insect tribes the like identity is observable. The flight of the Locust, the habits of the Ant as described by Virgil*, remain accurately as they were. The *Asilus* of the "Georgics" has its representative in the modern Gad-fly; and the "fly from the remotest parts of the rivers of Egypt" of Sacred Writ is still exemplified in the *Zim* of Bruce, the dreaded *Tzetze* of Livingston. Hence we may reason that the same sequence of constitution and habit had continued through ages anterior to historic record—consequently that the distinctive characteristics of the two races

* Æn. iv. 402 &c. Georg. iii. 147. Isa. vii. 18. The *Asilus* of the Romans appears to have been synonymous with the Grecian *Œstrus*.

specially in question are precisely those of their early prototypes. The nature of the Hippopotamus is too well known to admit of comment. This animal indubitably requires a temperature almost tropical, with a vegetation of corresponding luxuriance to sustain life. Deprived of these, in its natural state, it must die of inanition. The Reindeer, on the other hand, under such conditions, must unquestionably perish. The non-succulent Lichens, with other vegetable products found only under a climate subject to great seasonal variations, for food, and the power of alternating its habitat according to circumstances, are conditions indispensable to its existence.

That the Reindeer permanently inhabited the low lands of Périgord, under the hypothesis advanced by M. Lartet, that cooler seas and a more equable temperature rendered them at one time more congenial to its nature, is an assumption, I would deferentially remark, nowise reconcilable with observation. Admitting, for the argument's sake, the questionable position that such condition of climate existed, the assumed consequence does not ensue. In the northern regions (and I will particularize the frigid tract bordering on Hudson's Bay) the Flies, whose agency as affecting the Reindeer I have before specially noted, are notoriously troublesome. Around York Factory, situated on the verge of the great inlet mentioned, while the river-banks are yet encumbered with packed ice, the sea covered with floating drift, and when the ground is never thawed beyond a certain depth, the Mosquitoes appear in myriads, followed a little later by swarms of the Gad-fly—an almost intolerable pest, corresponding, as I conceive, with the Reindeer-fly of Northern Europe. A breeze from seaward, reducing suddenly the temperature, checks the torment for a while; but with the cessation it is renewed in all its vigour. Domestic Cattle under such circumstances can be preserved only by providing continued smoke from smouldering fires; while Man himself is reduced to adopt various expedients to mitigate the almost incessant scourge. Reindeer, the winter frequenters of these localities, are thus instinctively driven to migrate as already shown. As I have before remarked, these animals are peculiarly liable to the attacks of the *Œstrus*. Notwithstanding their regular migrations, indeed, they do not entirely escape the punctures and the deposition of the eggs of this formidable enemy. This is evidenced by the fact that, when killed in the early summer, the skins are (many of them) almost worthless for use, from the holes occasioned by the escaping larvæ that have been engendered there. From the native hunters I have learnt that at this season the Reindeer are subject to disease of the brain, sometimes inducing death, through the larvæ

being produced about the head and causing inflammation, probably through the obstruction of the lachrymal ducts*.

The fact mentioned by M. Lartet, that the Reindeer whose remains are in question had been killed at different stages of the annual mutations of the antlers, and consequently at all seasons of the year in the same localities, appears at first sight a strong objection to the general principle which I have advanced. This objection, however, cannot be admitted as conclusive, in violation of a strictly established natural law. There are two alternatives to account for the observed anomaly. The one is that some having been killed at a distance in their summer retreats, the antlered heads were conveyed by the hunters to a common rendezvous as trophies of the chase; the other, and the more probable, that the herds, molested in the mountains, and hunted persistently from refuge to refuge, broke at length from their retreats in quest of other less disturbed localities, and were intercepted during their progress. I have already, in my former communication, mentioned the tendency of this animal to go a long distance when really alarmed; and we may conceive that under continued molestation a herd might be driven in desperation to seek refuge even in its winter haunts in the lowlands, however adverse to its instinctive habits the enforced migration might be.

But a system of destructive persecution, such as is here indicated, could not possibly endure. It must end either in the total extirpation of the herds (which is not probable), or their compelled emigration to distant regions affording greater security—a result in accordance with the hypothesis which I at first advanced (see above, page 46). The southern parts of Gaul having been thus first

* It seems almost superfluous to dwell longer upon the peculiar characteristics, so well known to naturalists, which distinguish the Reindeer from the other branches of the *Cervidæ*. One peculiarity, however, may be cited as proving irrefragably that this animal has been designed by Nature to occupy constantly a region where it can enjoy a comparatively cold temperature—an end to be secured only by seasonal migration. Its hair is not *shed* in the spring like that of other varieties of the genus. Lengthening constantly, and becoming more compacted, to meet the exigencies of the winter, the extremities of the hair acquire gradually a lighter hue as they recede from the source of nourishment. With the approach of summer these exhausted ends break off, leaving still a permanent coating, of the normal colour, adequate to the protection of the bearer under the comparatively mild temperature of its summer retreat, but incompatible with the extreme heat of the lower elevations. This condition, inseparable from the organism of the animal, might of itself be adduced as argument against the coexistence in the same locality of the Reindeer with an animal so diverse in constitution as the Hippopotamus. Else we must forego the admission of that constancy of Nature in all her varied operations of which the evidences are manifest. I think Saint-Pierre alludes to the peculiar natural provision I have cited in his 'Harmonies de la Nature;' but I cannot find the passage, if indeed it exists.

evacuated, the herds probably lingered for a while in some of the northern districts —perhaps latest of all in the wooded tracts of Bretagne. This may be inferred from the fact that when Cæsar wrote, though the Reindeer had apparently then disappeared from all parts of Gaul, the inhabitants of Brittany were still distinguished by their neighbours as the "Rhedones," or Rhenones—a name perpetuated in that of the modern town and district of *Rennes**.

Collocation of Various Remains.—The argument derived from the juxtaposition of the remains of divers animals in diluvial deposits, as indicating synchronism of existence, however specious, is, I must again urge, to be received with very great caution. Applied to the earlier geological strata, where perfect correlation in the nature of the fossils is discernible, it must of course be admitted in all its cogency; but in the more recent formations, where great superficial agencies of disturbance have obviously been in operation, a prudent discrimination must be exercised to avoid conclusions which cannot be consistently reconciled with other considerations. Of such discrepancy the instance cited presents, I opine, a conspicuous example. It may, however, be regarded as an extreme case, and as nowise militating against the coexistence with the Reindeer of other animals less diverse in constitution, but of which the species may, like the Reindeer, have disappeared from certain localities, or become, as in other instances, extinct before human influences in comparatively modern ages. Of such extinctions the *Dinornis* of New Zealand affords, among Birds, a familiar example; and but for the positive evidence of its recent existence the Dodo of the Mauritius, judged from fossil vestiges only, might have been referred to a date long anterior to that of which we have proof. In like manner the Great Bustard has disappeared from England, its habitat even within the memory of Man.

During the diluvial epochs, of which the unmistakable evidences appear, it is obvious that many fragmentary remains, and even perfect skeletons, must have been transported to distances varying with circumstances. A great commingling

* The substitution of the *d* for the *n* in the original word has crept, through misprint or oversight, into some editions of Cæsar. Misled by this, Ainsworth, our standard English authority, notices only the former; but this reading is ignored by the best commentators. In two editions which I possess, while the *n* is preserved in the word applied to the animal, the *d* is employed in that assigned to the tribe, but, I believe, erroneously—an assumption supported by the form of its modern derivative, noted above. In perfect analogy with the name given to the ancient inhabitants of Brittany, under the interpretation I have given to it, is the term by which the natives of the "Barren Lands" of Mackenzie's River, who subsist chiefly by the Reindeer-chase, are distinguished by the other branches of the Chipewyan tribe to which they belong. It is paraphrased by the *voyageurs*, who call them *Gens de Caribou*; *quasi* Rhenones = *Gens de Renne.*

must have resulted—in some cases assuming the appearance of order, as the concurrence of eddies might have favoured the collocation in certain deposits of objects of nearly the same specific gravity. Successive inundations, and at more recent periods the action of great land-floods, the effects of local disturbances, would tend further to account for a collocation so far accidental; and thus remains, separated in their origin by wide intervals of time, might be found together in deposits, undistinguishable as to their relative eras of existence by any ordinary process of reasoning. Nor is the agency of Man, where vestiges of his existence may appear in proximity, to be disregarded. Primitive races, such as the Aquitanian Cave-men, would readily adopt as their occasional dwellings those excavations which in many cases had received the accidental deposit of ancient remains—the previous or subsequent haunts, perhaps, of various species of beasts then still existing, though now extinct. Or, impelled by superstitious reverence (no unfertile motive of action even among the rudest races), they might have conveyed to their retreats, as memorials, the casually developed relics of the gigantic mammals whose nature was to them a mystery. Or again, portions of such remains, when accidentally discovered, like the fossil ivory of the present day, might have been employed by them for artificial purposes. All these are suppositions, not susceptible indeed of proof, but compatible at least with probability.

From such considerations, joined to the experience which my own opportunities of observation have afforded, while deferring much to the opinions that have been expressed by various writers on this subject, I cannot but regard the argument derived from the mere collocation of varied remains in diluvial deposits, unsupported by the probabilities of other evidence, as apt to lead to very erroneous conclusions*.

I will not enter upon the many reasons that afford me ground for this opinion; yet I may mention one case which bears upon the question. In the summer of 1855, while engaged in a hasty tour to the verge of the Rocky Mountains, I stopped, in passing, at the Hudson's Bay Company's post at Walla-Walla. Fort *Nez-Percés*, the station in question, is situated in what, under the Oregon Treaty of 1846, became American territory—the rights of occupation, together with that of other posts similarly circumstanced, having since the period I speak of been ceded, under purchase, to the United-States Government. The position of this

* I notice that allusion is made, in a foot-note at page 60, to an account of the remains of a Mastodon found in Missouri in connexion with evidences of the contemporaneous residence of Man. I have never met with this account, and of course do not pretend in any way to question the conclusions arrived at. In fact I am myself disposed to think, both from evidences that appear and from the faint and fallible echoes of native traditions, that the existence of that animal in America may be reconciled with a comparatively modern date in the world's history. Still I am always inclined in such cases to accept with great caution the conclusions of observers, and to admit them only under the most cogent evidence.

post is in lat. 46° 13′ N., long. 118° 40′ W., a few miles below the junction with the Columbia of the Shoshone or Snake fork, flowing from the southward. Some days previous to my arrival, the officer in charge, the late Mr. James Sinclair, formerly of the Red-River Settlement, while witnessing an Indian horse-race near the Fort, observed a white object protruding from the sand on the surface of a low knoll on which he was standing. On examination it proved to be part of the thigh-bone of a gigantic mammal, which on examination I agreed with him in judging to have been a Mastodon. Some further portions had been discovered by scraping; and it was settled that on my return from the mountains in about two months we should proceed to level the mound, in the hope of discovering the remainder of the skeleton. Before my return, however, a war had sprung up between the local government and the Indian tribes, which eventually assumed rather formidable proportions. It was only through intimate acquaintance with the natives that our small party succeeded in penetrating downwards through the hostile masses. But the project was necessarily deferred; subsequently the Fort had to be temporarily abandoned: Mr. Sinclair was killed while accompanying a party surprised by an ambuscade. The fragments mentioned, buried, I believe, for security's sake, when the fort was evacuated, were never rediscovered; nor had I any subsequent opportunity of searching for the original deposit. The locality itself presents, as far as the eye can reach, an uninterrupted level, through which the Columbia flows; the small stream of the Walla-Walla coming in from the south. This level—a sea of sand many hundreds of square miles in extent, overlying a stratum of indurated sandy clay—yields little vegetation beyond the Artemisia, the Cactus, and other congenial plants, common to similar wastes of remote volcanic and diluvial origin. It may be regarded as part of the Great American Desert, extending from the frontiers of Mexico to the middle region of the Columbia River. The immediate portion under consideration has obviously formed at one period the bed of an extensive lake, occasioned by the damming of the waters by a basaltic rampart, extending from the Cascade range to the Blue Mountains, and through which the river, after flowing placidly for many miles, bursts by a narrow gap.

On the surface of this great plain, under a dry climate with excessive summer heat, innumerable relics of bygone generations are met with, discovered or again concealed by the constantly shifting sands—the bones of various indigenous animals, human remains, the skeletons of Horses (descendants of the race imported originally to the southern regions by Cortez and Pizarro), the bones of domestic cattle introduced within the last half century. Beneath, buried more or less deeply by the clay, it may be assumed that many fossil remains of distant ages exist. In some cases these fossil deposits are presumptively very superficial, as may be argued from the instance above noted. In this case there appeared, scattered on the surface around or partially buried in the sands, many human remains—some, doubtless, in close contiguity with the Mastodontal relic. These we had long known, from positive evidence, to be the remains of a war-party of the Shoshones, who, about seventy years ago, made an attack on the united Nez-Percés and Walla-Wallas, and were repulsed with slaughter. Stone arrow-heads, and other primitive weapons of offence, are of course discovered occasionally around the arena of conflict; and under the constant process of weathering and desiccation, the remains, even when I first visited the scene many years ago, had then already assumed the appearance of antiquity.

I do not, of course, assert that the vestiges in question would have misled the experienced and cautious observer, but refer only to the conclusions to which, with the less discriminating, the circumstances would probably have tended. But, on the other hand, were it permitted to imagine that by a sudden convulsion the united waters of the Columbia and its great tributary (the Snake) were again temporarily dammed up, so as to restore the wide expanse to something resembling its ancient condition, we may partially conceive the effects that must ensue upon the subsequent *débâcle*. A heterogeneous commingling of the remains of diverse existences would be a consequence, much as that which I assume to appear now on a grander scale

in the ancient Diluvial Drift. Thus collocated, the lapse of a few centuries, all record of the event being supposed to be absent, would suffice to render the facts enigmatical to the shrewdest observer of a future day, unguided by the consideration of those analogies which only could aid in solving the apparent mystery. Yet it needs but a small effort of the imagination to suppose the possibility—nay, even the probability—of an occurrence such as I have indicated. The effects of an earthquake, even less formidable than that which but recently devastated a portion of South America, might suffice to close temporarily the very narrow portal in the volcanic barrier, by which the drainage of the ancient lake-bed has been effected, and through which the still partially impeded river now rushes.

Indeed, that the probability of a stoppage such as I have supposed is not entirely visionary, we have evidence, of a comparatively recent date, at a point about 150 miles lower down the river. At this point, where the Columbia breaks through the Cascade range, to flow afterwards tranquilly to the ocean, a stupendous mountain-slide, the effect of some great convulsion, has taken place, the date of which, as well from the accounts formerly given to me by the elders of the Indian residents as from evidences that appear, could not certainly have been more remote than towards the end of the last century. The river, in this part flowing between lofty ridges, temporarily dammed, rose far above its wonted boundaries for many miles up, in such wise that the inhabitants of the banks escaped only by means of their canoes. Gradually the pent-up stream forced its way through the impeding mass; but huge fragments of rock still obstruct the contracted channel, occasioning the unnavigable rapid now known as the "Cascades." Owing to this partial obstruction, the waters of the upper vicinity, with a retarded current, have since flowed permanently at a height some 15 or 20 feet above their former level, submerging the lower banks with their forest-growth, of which at various points the slowly decaying stumps, chiefly of the *Abies Douglasii*, were conspicuous some years ago and doubtless still remain*.

But there is perhaps no part of the world where the grand natural changes, constantly operating through very simple causes, are better exemplified than in some parts of the Upper Fraser, in British Columbia. Flowing for a long distance through deep wooded banks of diluvial origin, beneath which, in places, there is exposed a thin stratum of lignite, the river bursts, about twenty miles below Alexandria†, through a chasm in a lofty volcanic barrier. Above this are evidences of an ancient lake-bed, drained suddenly at successive intervals, as indicated by the corresponding terraces along the banks, much (though, from the hilly nature of the country, on a comparatively inexpansive scale) as the similar process indicated at Walla-Walla under the description I have given. Along the banks, for more than 100 miles above this point, land-slides of greater or less magnitude are constantly occurring. The fall of one of these I had the good fortune (if to have narrowly escaped destruction with the whole of my command may so be termed) to witness, when in charge of Fort Alexandria in 1845. Another, upon a still grander scale, some seventy miles higher up, I had examined shortly after it fell, some time before. In this last case, with a vertical depth approaching 500 feet at the line of rupture, and an area of perhaps a thousand acres or more, the surface exhibited a complete *bouleversement*, like an ill-ploughed field gigantically magnified. Under similar processes the river,

* The truncated stems of these huge trees are doubtless greatly preserved from decay by the drying effect of the fierce gales of wind that almost incessantly prevail in this locality. At the same time the lower portions, which are more or less silted over, are probably to some extent petrified. This I infer from the numerous petrified fragments that appear along the banks, especially in the immediate neighbourhood of the Cascades.

† Alexandria is in lat. 52° 33′, about midway between the mouth of Fraser River and its source in the Rocky Mountains.

with an impetuous current, is constantly shifting portions of its channel; and the stupendous effects of water thus temporarily arrested are exemplified in a degree of rare magnificence.

To my conception these minor effects were typical of the grand cataclysms of which the geological evidences are apparent; and, from the heterogeneous commingling of the relics of different ages which must obviously hence ensue, the corresponding confusion in remote epochs, over wider areas and on a scale immeasurably more grand, is necessarily to be inferred.

Fig. 57.

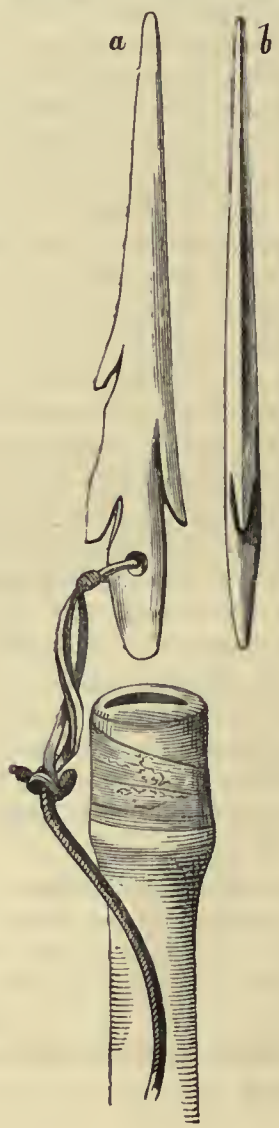
Portion of an Harpoon-head of Reindeer-horn, from La Madelaine. (Christy Collection.)

Fig. 57. This butt is convex on one face and nearly flat on the other. The perforation is deeply cut in and grooved on both faces.

Fig. 58. The loose head is of Walrus ivory, and is 7 inches long. It is attached to a long, cylindrical, pine-wood shaft (tapering downwards), 7 feet long, by a square plaited cord of sinew, 8 feet long, dividing into two branches for rather more than half of its length where attached to the shaft, similarly to the Sea-Otter arrow, fig. 13, p. 51, in Part III. A large air-bladder is attached to the shaft near its lower extremity.

Fig. 58.

Harpoon (half nat. size) from the Konjags of Alaska, for comparison with fig. 57.



XV.

ON SOME BONE- AND CAVE-DEPOSITS OF THE REINDEER-PERIOD IN THE SOUTH OF FRANCE.

By John Evans, Esq., F.R.S., F.S.A., Hon. Secretary of the Geological and Numismatic Societies of London, &c.

Preface.

This Paper, written soon after a Visit to the Caves on the Vézère, in company with the late Mr. Henry Christy and other friends, was read before the Geological Society of London on 22nd June, 1864. A short Abstract only appeared in the Quarterly Journal of that Society, vol. xx. p. 444.

When first I was requested to allow of this Paper being printed in the 'Reliquiæ Aquitanicæ,' it was a question with me whether it was in any way desirable that it should appear in type. In consenting to its being printed, it seemed best that it should stand in its original form, as the only merit it possessed was that it conveyed my first impressions of what, at the time of its being written, was a novel and comparatively unexplored field of research. With one or two verbal corrections, the paper is therefore reproduced in the exact form in which it was communicated to the Geological Society.

With the large experience that has since been gained, much might have been added, and some of the suggested difficulties as to the chronological position of the Reindeer-period might to a certain extent have been removed. The relatively superior antiquity of the Moustier relics over those of the other Caves, however, has been almost universally acknowledged; and attempts have been made to arrange the whole series in an approximately chronological order, more especially by M. Gabriel de Mortillet. My own views upon the subject I have given elsewhere*. I will only add that, with all our advance in knowledge, including the experience gained by the skilful examination of the Belgian caves by M. E. Dupont, there still remains much to be learned before we can, with any degree of confidence, assign any definite date to either the earliest or the latest of these Cave-deposits.

J. E.

April 1873.

Introduction.—In these days, when the Cavern-deposits throughout the globe are deservedly attracting so much attention, and when the limits of the Borderland that lies between the provinces of Geology and Archæology are being gradually extended, a slight notice of some of the caves and bone deposits of the Southern part of Central France will probably be of some interest to this Society. The deposits to which I would more particularly direct attention are those which have been and are still being explored with so much success under the auspices of the distinguished French palæontologist, M. Edouard Lartet, and our energetic countryman, Mr. Henry Christy, both Fellows of this Society. It was under the guidance of the latter gentleman, and accompanied by our President (Mr. W. J.

* The Ancient Stone Implements, Weapons, and Ornaments of Great Britain (1872), pp. 436–438.

Hamilton), Prof. Rupert Jones, Capt. Galton, Mr. Lubbock, and Mr. Franks, that I visited the localities at the end of March last, and was thus enabled more fully to estimate the value of the facts detailed in the communications already addressed by M. Lartet and Christy to the French Academy* and to the 'Revue Archéologique'†. It is to these memoirs, and to information received from their liberal authors, that I am indebted for many of the facts that I am about to adduce. I am also indebted to Prof. Rupert Jones for the sketches which illustrate this paper.

The principal spots where the investigations of Messrs. Lartet and Christy have been carried on are situated within the valley of the Vézère, or in those of its affluents in the Arrondissement of Sarlat, in the Department of the Dordogne. [See the Map at page 126, in Part X.]

The Valley of the Vézère: River and Cliffs.—The river Vézère, which takes its rise near Chavagne, in the Department of the Corrèze, enters Dordogne as a considerable stream near Terrasson, and, after pursuing a tortuous course in a south-westerly direction for about thirty miles as the crow flies, joins the river Dordogne at Limeuil a few miles south of Le Bugue. In the neighbourhood of Terrasson the Vézère passes over a small tract of Carboniferous beds, which are regularly worked for coal; but by the time it reaches Condat, where first we joined the river, its valley is excavated through rocks belonging to the Jurassic series, which near Aubas, a few miles lower down, are exchanged for those of the Cretaceous system. [See Geological Map and Section, *suprà*, page 29.] It is neither in my power, nor is it in the slightest degree necessary for my subject, to enter into any stratigraphical details with regard to this succession of beds, which, however, in general appearance, present a considerable contrast to their equivalents in this country. I will only mention that the Cretaceous beds, from the Lower Greensand upwards‡, assume, in the Department of the Dordogne, the form of a compact limestone, more or less arenaceous in its different subdivisions, which also vary considerably in hardness. [See Geological Notes, by T. Rupert Jones, at page 31 &c.]

The valley of the Vézère seems to afford good evidence of its having been, at all events as to that part of it more immediately visible from the river, excavated by the action of the river itself, aided by the action of the frost and

* Comptes Rendus, 29 Feb. 1864. † Rev. Arch. April 1864.

‡ A notice of the Chalk formation of this Department, from the pen of M. Arnaud, will be found in the 'Bull. de la Soc. Géol. de France,' 2nd ser. vol. xix. p. 465.

atmosphere. The bottom of the valley consists of an alluvial plain, varying in width from $\frac{1}{4}$ to $\frac{3}{4}$ of a mile, and skirted, first on one side and then on the other, or occasionally on both, by a line of precipitous cliffs. In cases where the river no longer flows at the foot of these cliffs, a considerable *talus* has been formed by the weathering of the rock; in some places the degradation has gone on to such an extent that the side of the valley presents an even slope, though occasionally a low cliff-like face of rock may be left exposed, as if to show that what is now for the most part a uniform declivity may have been originally, when the river flowed on that side of the valley, a sheer precipice. In other places, where the river now flows at the foot of the cliffs, occasional masses of fallen rock, standing out from the stream, which in many parts is very rapid in its course, testify to its undermining-power, though in one instance, at least, an ancient *château*, with the rock on which it stands undercut to a great extent, but not yet brought down by the river, proves that its action, though sure, is slow. Near Condat the river has worked its way to a considerable depth beneath the level of its older alluvium, and is gradually cutting away a low line of limestone cliff, some 15 or 20 feet in height, and a full quarter of a mile away from the older boundary of the valley at the margin of the alluvial plain.

In hardly any case is the summit of the present line of cliffs at the highest level of the surrounding country, but the cliffs form an abrupt termination to sloping ground, on which beds containing large rolled pebbles of quartz, gneiss, mica-schist, granite, and other of the metamorphic rocks of the country to the north-east, through which the stream passes in the upper part of its course, are of frequent occurrence. Whether these are in all cases connected with the beds of Miocene age which cap a considerable portion of the *plateau* of the district, or whether any of them represent the "high-level" gravels of the river, are questions which I will not attempt to determine.

The height of the cliffs at the side of the valley must in many places be at least 300 feet; and the scenery brought to view in descending the windings of the river (as we did) in a boat, is strikingly picturesque. Owing to the different degrees of hardness of different beds, which I have already mentioned, the weathering of the face of the cliff has been very unequal. The percolation of water through the softer beds, combined with the action of frost, has caused them to perish much faster than harder beds above and below; and the consequence has been that in many (I may say most) places there are deep grooves along the face of the cliffs following the almost horizontal lines of stratification, and where the cliffs stand out like rounded bastions, following their contour. In some places two or three

of these grooved recesses occur one above the other. They vary considerably in depth, but frequently extend as much as 20 or 30 feet into the face of the rock, and are occasionally continuous for some hundreds of yards. The roof is sometimes flat, but more generally arching over the recess; and the floor generally slopes outwards, partly in consequence of the accumulation of *débris*, where the recesses have not been artificially altered or enlarged. For, as may well be supposed, these natural shelters are made use of by the inhabitants of the country, and have been, as we shall shortly see, from the earliest ages. Numbers of cottages along the sides of the valley consist, even at the present day, of merely front and side walls, the native rock serving for floor, back, and roof. But a few centuries ago, even some of the *châteaux* were built on shelves in the rock, with their terrace-walks extending along these natural cloisters, with the rock arching overhead and the beautiful valley of the Vézère forming the landscape. [See "Sketches on the Vézère," Nos. 3 and 4, in Part IX.] The whole valley teems with the remains of these rock-habitations; and there are hardly any of the natural galleries, however inaccessible, but show some traces of human occupation, by recesses, or even chambers of various sizes, cut into the cliff, by mortices for beams, or eyes through which ropes might pass, or by remains of steps cut in the rock. Such is a general outline of the principal features of the valley of the Vézère between Condat and Les Eyzies, and of the "Petra" along its course between Le Moustier and the latter place; and, as far as my observation went, the same description would be applicable to many other valleys in that part of France.

Caves and Rock-shelters on the Vézère.—I now come to the Bone- and Cave-deposits which form the more immediate object of this notice. [The relative positions of the Caves and neighbouring villages are shown in the Map at page 29, and the corrected Map at page 126, and by the Woodcuts, figs. 37–40, at pages 64 and 65.]

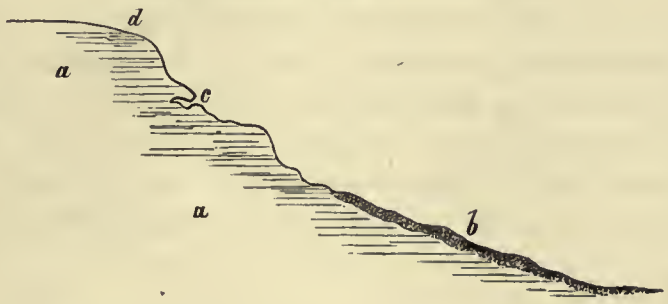
Badegoule.—The first of these which we visited was the Cave of Badegoule (fig. 59), mentioned by the Abbé Audierne*, where, however, no recent excavations had taken place, and the Cave itself had been emptied. It faces the south at an elevation of about 250 feet above the Cerne (a small tributary of the Vézère), and is about a mile from the Condat Railway-station, on the right-hand side of the road leading from Terrasson to La Bachelerie.

* De l'Origine et de l'Enfance des Arts en Périgord (1863), p. 18.

On what had apparently been a terrace in the rock below the cave, we found portions of a layer of breccia resting against the cliff, and containing fractured bones, worked flints, and some charcoal. The whole surface of the ground in front, which had been converted into a vineyard, was literally strewed with worked flints, bones, and teeth, among which we recognized those of the Horse, Ox, and Reindeer. The worked flints consisted of flakes and the cores or *nuclei*

Fig. 59.

Diagram Section of the Hill above Condat.



a, Jurassic Limestone.
b, Sand and stones (quartzite &c).
c, Badegoule; vines on the platform.
d, Top of hill (vineyards), with a few foreign stones on the surface.

from which they had been struck, scrapers (*grattoirs*) or flakes worked to a rounded end, some fragments of carefully chipped lance-heads, and of long narrow blades neatly chipped on both faces, and of a few other forms. Many of them have a stalagmitic coating upon them, proving that they had been derived from the breccia. As this is only one of a series of very similar, but better investigated cases, I propose giving a short description of them all, and of the character of the objects discovered at each, before proceeding to any general considerations.

Le Moustier.—After sleeping at Montignac, the next spot which we visited was the Cave at Le Moustier, explored by MM. Lartet and Christy during the course of the previous winter (figs. 60 and 61; and Lithographic Sketch, No. 1, in Part V.). This, more correctly speaking, may be said to be a recess running along the face of the cliff rather than a cavern in the ordinary acceptation of the word. It lies on the north bank of the river, about 80 feet above its level, and was until lately filled up within a few inches of the roof by a succession of beds varying in thickness at different spots, but preserving generally the following arrangement in descending order:—

		ft.	in.
1. Calcareous rubble, with a few flint flakes, reaching nearly to roof of cave at the back, and filling it up in front	about	2	6
2. Dark-coloured bed, containing numerous fractured bones, worked flints, and calcareous and other pebbles. A regular kjökken-mödding	about	1	0
3. Layer of red micaceous sand, containing but few bones and worked flints	about	1	6
4. Bed containing stones used for hearths, with charcoal, bones, and worked flints. (Both this bed and No. 2 are brecciated in places.)	about	1	0
5. Hard brecciated bed, containing rolled flints and quartz and other pebbles, and possibly bones	about	1	0

The bones in the upper beds comprise those of the Horse, Aurochs, Chamois, Reindeer, and other animals; but the remains of the Reindeer are not so abundant as they are at some of the other stations shortly to be described. In the bed of sand No. 3 some detached plates of molars of *Elephas primigenius* were found by MM. Lartet and Christy, who also discovered in the Cave some remains of *Hyæna spelæa*, but not under such circumstances as, in their opinion, to justify

Fig. 60.

Eye-sketch of Le Moustier, from the opposite side of the river, showing the upper Cave (said to contain nothing), and Le-Moustier Cave, partly railed off, and with garden-ground in front of it.

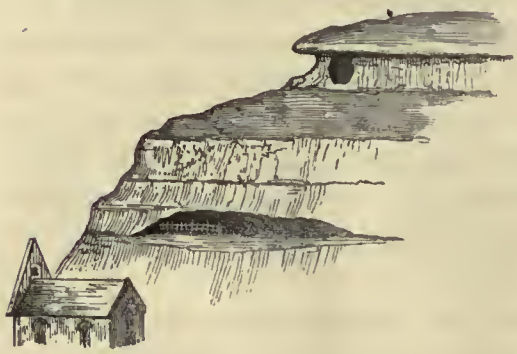
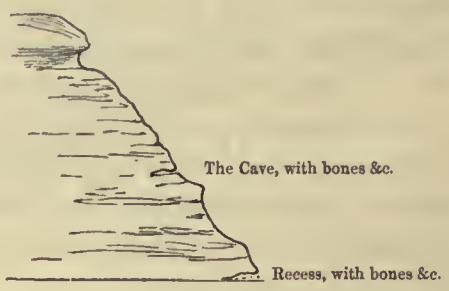


Fig. 61.

Diagram Profile of the Limestone Escarpment of Le Moustier, from the South-west, about 190 feet high.



in this instance an inference of their contemporaneity with Man. None of the bones found here have been carved or wrought into instruments of any kind. The worked flints discovered here present a different *facies* from those which we saw at other places in the valley of the Vézère. The smaller and more delicate and taper flakes are far less frequently found than at the other stations lower down the valley; and the coarser broad flat forms predominate; "scrapers" are comparatively scarce; and many of the cores or nuclei, if such they are, are irre-

SKETCHES ON THE VEZÈRE. No. 1.

View of Le Moustier on the Vezère, and the Hill with its Caverns. Taken from the River, by W. Tipping, Esq., F.S.A., October 1864.

The Cavern examined by Messrs. H. Christy and E. Lartet is the Lower Cave, seen just over the housetops.

5T Oct 1862 mousher

Sketches in Dordogne No. 1

Vincent Brooks Day & Son Lith.

gularly flattened, though approaching occasionally in form to what have been termed sling-stones, or even to some of the ruder flint implements from the river-gravels of the Valley of the Somme and elsewhere. But the most remarkable forms are those presented by a series of implements of common occurrence at Le Moustier, but which I had never before met with. These are made from flints, some of considerable size, either flat by nature or wrought into a flattened shape so as to be conveniently held in the hand, and carefully chipped along one side to an evenly curved cutting edge. In some cases this edge is continued round the end of the flint so as to produce a rounded cutting point; and occasionally the flint has been chipped into an ovato-lanceolate form with a cutting edge nearly or quite all round. These latter bear the strongest resemblance to some of the flint implements from the river-deposits at Abbeville, from which indeed they can hardly be distinguished in form. There are, however, at Le Moustier all the intermediate forms between them and the flat flints chipped at one side only into a cutting edge with a more or less circular outline like a very large "scraper."

So much for the contents of the Cavern; the question now arises how it became filled to such an extent, as, though a great portion of the beds is evidently the result of human occupation, yet the cause why the *débris* should have accumulated up to the roof of the Cavern is not so apparent. As to the origin of the lowest bed (No. 5) I can pronounce no decided opinion, as it appears to be uncertain whether worked flints and fractured bones occur in it or not; but it seems by no means impossible that the rolled flints with which it abounds may be connected with or derived from a high-level gravel of the river. The bed above it, containing the hearth-stones, is of course the result of human occupation of the recess at the time when there was probably a clear space of some 4 or 5 feet above the floor. The difficulty is to explain the presence of the upper beds. It appears, however, that the stratum of rock forming the floor of the Cave originally extended, as a broad ledge, some 30 or 40 feet in advance of the present line of cliff above. In fact the whole hill at this particular spot is divided into several steps or stages, giving it a general trap-like outline. I would suggest, as a possible hypothesis, that on this ledge, which was possibly protected by some portion of the roof of the recess which has now been weathered away, the ancient occupants of the station lodged when the height of the back of the Cave had been diminished by the accumulation on the floor, and had thus been rendered less habitable. After this desertion of the back of the Cave, the sand resulting from the decomposition of the rocks around accumulated on the old floor by atmospheric agency, and subsequently, as the kjökken-mödding outside the recess increased in height, the

refuse of the meals was thrown back over the layer of sand; and then, after the desertion of the Cave, the *talus*, which accumulated by successive falls from the face of the cliff, filled up the recess entirely in front and nearly to the roof at the back, and finally, by the weathering away of the edge of the ledge of rock on which it rested, was partially removed from outside the recess.

On a lower edge of the hill at Le Moustier is a second deposit containing worked flints and bones, but which we had not the opportunity of narrowly examining; the whole neighbourhood, indeed, appears to abound with similar remains. On the opposite side of the river the cliff is replete with rock-habitations of a later period. In a brickfield near the village I found a number of flint flakes, some of them imbedded at depths of from 4 to 5 feet in the alluvium.

La Madelaine.—The next spot we visited in descending the Vézère was the station, near the ancient castle of La Madelaine, which has been and still is under examination by Messrs. Lartet and Christy. It lies at the foot of the cliff on the north bank of the river, about 30 yards distant from it; and the upper surface of the deposit is not more than 20 feet above the level of the stream, so as to be even now within reach of the highest floods. The beds, which must be about 50 feet in length by about 25 feet in width and 8 to 10 feet in thickness, lie in a recess under the overhanging cliff, a portion of which appears, however, to have fallen off not more than a century or two ago, at the most. The upper bed consists principally of rubble from the cliff above; but the lower part of the deposit is a regular kjökken-mödding, rich beyond conception in the rude implements formed by the primitive occupants of the spot. Flint flakes of all sizes, many of them of most symmetrical form, some of great length and others of most diminutive size, "scrapers" of various forms and sizes, and cores or nuclei of flint abound. Interspersed in the deposit are numerous large stones used as hearths, and occasionally, as it appears, arranged to form a sort of oven. There are also numbers of large pebbles of quartz, granite, and other rocks, some few of which, of spheroidal form, have had a slight recess worked in one of their faces so as to look like a sort of mortar; a few others bear traces of rubbing upon them; and many others, especially of quartz, have their edges battered, or have even been broken, by having been used as hammers. A few flint cores bear traces also of having been used in the same manner. Some of the flakes and scrapers have been broken diagonally from each side so as to produce a pointed end or tang, as if for insertion into a handle, or for use as a narrow chisel. But in addition to the worked flints, the beds contain a large number of implements, of various forms and sizes, made of

Reindeer-horn or of bone. The principal of these are dart- or arrow-heads with a number of barbs running along either one or both sides,—*stylus*-shaped instruments, pointed at one end and chisel-shaped at the other [harpoon-points], and needles of good finish and workmanship, with neatly drilled eyes. Some perforated pieces of Reindeer-horn, and others bearing the marks of sawing upon them, have also been found, as well as some bearing animal forms sculptured upon them, but not so finely engraved as those which will subsequently be mentioned. The deposit is of course full of animal remains; but the fauna is the same as that of the Cave of Les Eyzies, which will shortly be described.

Laugerie Haute and Laugerie Basse.—Descending the valley, the next place to be noticed is Laugerie Haute, where a nearly similar deposit to that of La Madelaine occurs, in various places at the foot of the cliffs on the right bank of the river, over a distance of upwards of half a mile to Laugerie Basse. In one place, where the ossiferous deposit is covered by a large mass of rock which fell from the cliff about 120 years ago, it attains a thickness of from 7 to 8 feet; but it is usually rather thinner. Besides containing worked flints of much the same character as those at La Madelaine, a number of fragments of the more carefully chipped lance-heads, similar to those from Badegoule, and of what are possibly crescent-shaped implements, like those so frequently found in Denmark, have been found here, as also a few arrow-heads of the leaf-shaped type, and some flakes skilfully chipped into a knife-like form. The animal-remains, which are usually very friable, are the same as at Les Eyzies; but a few teeth of the *Megaceros hibernicus*, and some detached plates of molars and portions of the tusk of *Elephas primigenius*, have been met with.

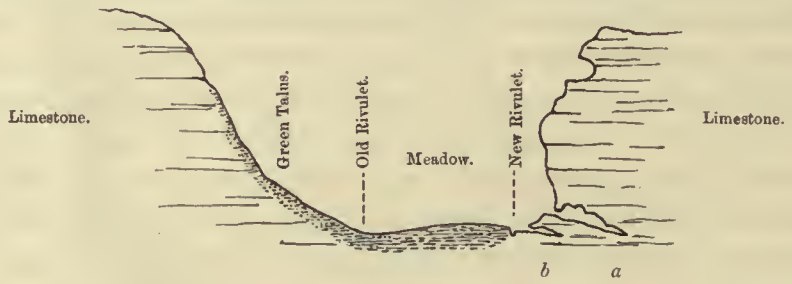
I had not the opportunity of making more than a cursory examination of the deposit at Laugerie Basse, whence Messrs. Lartet and Christy have procured a large number of important objects. The scene of their excavations lies beneath the shelter of the overhanging rock on the right bank of the river, and about 30 feet above its level. In general character the beds approach very closely to those of La Madelaine. The worked flints, especially those of small size, are common; but the carefully chipped forms, such as those from Laugerie Haute, appear to be extremely rare. Reindeer-horns, both shed and attached to portions of the skull of the animal, are very abundant; and nearly all have had some portion of them removed, apparently by means of flint saws. Instruments carved from these horns are also numerous, and present a considerable variety of form, some of them being also ornamented with patterns in relief. Besides these, there

are many needles of bone, and a few teeth and bones pierced for suspension as personal ornaments; among these are some of the small ear-bones of the Horse and Ox and a canine tooth of a Wolf. But the most remarkable objects are engravings on portions of Reindeer-horn, giving what M. Lartet suggests are:—representations of the Aurochs and *Bos primigenius*; some carvings in relief, on the surface of an harpoon-shaped instrument, of the heads of the Horse and Stag; and a highly spirited carved figure of a Reindeer most skilfully adapted to form the handle of a sort of poniard made from the horn of that animal. The same fauna prevails here as at Les Eyzies; but some detached plates of molars and a portion of the pelvis of the Elephant have been found.

Gorge d'Enfer.—On the same side of the river as Laugerie, but a little lower down the valley, and in a ravine opening into it, are the caverns of the Gorge d'Enfer (fig. 62), where also similar deposits have been found, containing the

Fig. 62.

Diagram Profile of the Gorge d'Enfer, a lateral Valley on the right Bank of the Vézère.



a, Cave, with Bones &c. *b*, Recess, with Bones &c.

usual worked flints and fractured bones—among the former some of the more carefully chipped specimens. It appears probable that these caves had been emptied to a great extent at the time of the French Revolution, for the sake of the saltpetre to be obtained from their contents.

Les Eyzies.—I now come to the renowned Cavern of Les Eyzies—renowned because, owing to the unprecedented liberality of its explorers (Messrs. Lartet and Christy), almost every museum of note, whether public or private, not only in France and England, but throughout a great part of the civilized world, has had specimens of its breccia, worked flints, and animal-remains presented to it; so that the name of Les Eyzies is everywhere known; and it is to be hoped that the

SKETCHES ON THE VEZÈRE. No. 2.

View of part of the village of Les Eyzies, near the junction of the Beune and the Vezère, showing the position of the Cave worked out by Messrs. H. Christy and E. Lartet.

Taken by W. Tipping, Esq., F.S.A., May 1867.

The position of the Cave is indicated by the point at which the two lines at the margin would intersect if continued over the plate.

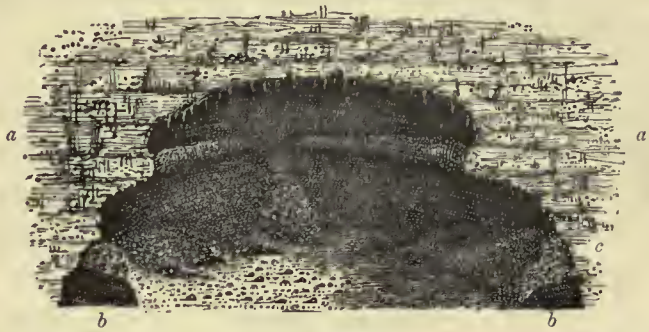
Vincent Brooks Day & Son Li

collections formed there may in many instances prove to be the nuclei around which may centre collections from analogous cave-deposits in other countries. The cave or grotto is situated on the north side of the Valley of the Beune, a small tributary of the Vézère, and about half a mile above the junction of the two streams. [See Lithographic Sketch, No. 2, in Part V. The situation is shown on the Maps already referred to, and in figs. 37–40, pp. 64, 65.]

It is a fine vaulted cave, in plan approximating to a segment of a circle about 50 feet in diameter, with an arc of about 90 degrees cut off to form the opening. Its floor is a continuation of a ledge of rock nearly 120 feet above the river, the face of the cliff being at this spot divided into steps or terraces in much the same manner as at Le Moustier. There is a stalactitic coating over much of the roof; and the greater part of the floor of rock was, before Messrs. Lartet and Christy's explorations, covered by a layer of hard breccia from 4 to 10 inches thick, cemented by the infiltration of water charged with calcareous matter (fig. 63).

Fig. 63.

Diagram of the Cave-deposits at Les Eyzies.



a, Limestone.
b, Hearth-stuff, with Bones, Flint Flakes, and Implements of Stone and Bone.
c, Breccia of Limestone, cemented with Stalagmite.

Above this there had formerly existed a looser deposit, of the nature of a kjökken-mödding, from 2 to 3 feet in thickness, which had been removed some years ago, but of which some portions remain cemented by stalactite to the walls of the cave. The stalagmitic breccia from the floor contains, as usual, a number of worked flints of much the same character as those from La Madelaine, and also many pebbles of quartz, gneiss, granite, and other rocks, some of which have been used as hammers, and others have been exposed to the action of fire. Some of the rounded stones, with mortar-like depressions in them, have been found here, and also several pieces of hæmatitic iron-ore, the surfaces of which have evidently

been scraped so as to produce a kind of raddle or red paint, which must have been used by the occupants of the cave for ornamental purposes. There are also traces of hearths and fragments of charcoal, as well as a great deal of sooty matter dispersed through the bed. Numerous bones and teeth are, as usual, interspersed. The former, if they were such as contained marrow, have in all cases been broken, probably with the pebbles already mentioned as having been used as hammers, while the bones without marrow, such for instance as the numerous small bones of the carpus and tarsus, have been left not only unbroken but in many cases undisturbed in their relative positions, proving, as M. Lartet has remarked, that the ancient hunters who inhabited these spots, though greedy for marrow, did not care for gristle, and moreover had no dogs. Harpoons and arrow-heads of Reindeer-horn, bone needles, and whistles formed by piercing a hole in the lower side of the hollow phalanges of Deer have been found here, the latter having also occurred at Laugerie Basse. Besides these, bones and even pieces of schist with engravings of various animals upon them have been discovered. A fragment of Elephant's tusk, showing traces of human work, and a metacarpal of a young *Felis*, of great size (*F. spelæa ?*), presenting numerous cuts and scratches like those on the bones of other animals in the mass of refuse, have also occurred.

Remains of Animals in the Caves.—The animal-remains, whether from La Madelaine, Laugerie, or Les Eyzies, are, as I have already observed, for the most part of the same species. The complete list has not yet been published by MM. Lartet and Christy; but the following appear to be the animals whose bones are found in the greatest abundance:—

Equus caballus.	Megaceros hibernicus.	Bison europæus.
Sus scrofa.	Antilope rupicapra.	Spermophilus.
Cervus tarandus.	—— saïga.	Lepus timidus.
—— elaphus.	Ibex.	Sciurus.
—— capreolus.	Bos.	

Besides these, remains of several species of Birds and Fishes have been found.

Besides these remains of the lower animals, a few Human remains have occurred. At Les Eyzies part of the jaw of an individual, of small stature, was found among the *débris*, but its position appears to be undetermined; while at La Madelaine the fragment of the skull, the half of the jaw, and several of the long bones of a large subject were discovered in the midst of the fragmentary bones and worked flints which constitute the mass. These human remains I have not seen; but the fragmentary state of the cranium and the occurrence of the bones in the middle of an

SKETCHES ON THE VEZÈRE. No. 3.

View of the Château des Eyzies. By W. Tipping, Esq., M.P., F.S.A., May 1867.

This fine old ruinous Chateau, parts of which have been excavated in the rock against which it is built, stands at the angle to the south-west of Les Eyzies village, near the junction of the Beune with the Vezère. It is visible in the distance in the Woodcuts, figs. 38, 39, and 40, pages 64 and 65.

Sketches in Dordogne No 3

indubitable "kjökken-mödding" seem inconsistent with their presence being due to any ordinary sepulture, and to be rather suggestive of one of those periods of famine which must of necessity occasionally occur among a people entirely dependent upon the chase for its means of subsistence, and under the pressure of which men of far higher civilization than the ancient occupants of these caves have been driven to support their own life at the expense of that of one of their fellow-beings.

Relative Antiquity of the Caves and their Contents.—Our concern here is not, however, with the mode of life or the ethnological peculiarities of these ancient inhabitants of Périgord, but with the antiquity of the deposits containing their remains.

To arrive at some approximate estimate of this, there are four methods of inquiry open. We may to some extent judge of it:—

1. From Geological considerations with regard to the character and position of the Caves.
2. From the Palæontological evidence of the remains found in them.
3. From the Archæological character of the objects of human workmanship; and
4. From a comparison with similar deposits in neighbouring districts in France.

Under the first head of inquiry the subject is fortunately free from any questions as to the "diluvial" or aqueous origin of the deposits—questions which in other cases have led to so much discussion, especially among French geologists. Notwithstanding the presence of numerous rolled pebbles, common in the adjacent gravels, but which have been brought in for the purpose of being used as hammers, hearth-stones, and heaters, the deposits are beyond all doubt the refuse-heaps arising from the human habitation of the caves—kjökken-möddings pure and simple. As far, then, as Geological evidence of their antiquity goes, it is merely a question as to what changes have taken place in the valley since their accumulation; for the time necessary for the formation of the stalagmite which in some cases overlies them, or of the calcareous breccia into which they have occasionally been converted, is so dependent upon variable conditions that it seems needless to take it into account. These changes in the valley have then, it must be confessed, been but slight. The face of the cliff above many of the recesses cannot have weathered away more than a foot or two at the utmost since their occupation; and though in some cases, as at Le Moustier and one of the

caves in the Gorge d'Enfer, a *talus* has at one time or another accumulated sufficient to obscure the mouth of the cave, yet this seems to be the exception rather than the rule. Neither has the river deepened its course to any appreciable extent, as some of the caves or recesses are even now within reach of its highest floods. Still we have evidence of the remarkable power of the cliffs to withstand the influence of weathering, in the well-preserved remains of the ancient rock-habitations which I have mentioned, and in the fact that the extraordinarily severe winter of 1863–64 produced but the slightest effect upon the face of the rocks; so that with the present climate a small amount of degradation may testify to an enormous lapse of time*. And it must be borne in mind, in comparing the erosion of the valley during the recent period with the great extent of the total excavation, that in all probability it had gone on to some extent before the submergence of the country during the Miocene period, and that since that time there is no evidence of the valley having been protected by submergence from the erosive power of the river, which therefore must have been in operation for ages, while its power during the period of the great extension of the Glaciers must have been inordinately greater than at present. Though, therefore, the geological changes in the Valley of the Vézère have been but slight since the occupation of the caves, they are not inconsistent with a considerable degree of antiquity, historically (not geologically) speaking, being assigned to these deposits.

I now come to the Palæontological evidence of the case. The animal remains which have been discovered in the alluvial deposits and caves of the South of France may be, and indeed have been, broadly divided into two groups. The earlier of these, like the Postpliocene group of other parts of Western Europe, is characterized by the presence of *Ursus spelæus*, *Hyæna spelæa*, *Felis spelæa*, *Elephas primigenius*, *Rhinoceros tichorhinus*, and perhaps some other animals, though comprising also most of the members of the later group. The principal of these seem to be *Ursus arctos*, *Canis lupus*, *Megaceros hibernicus* (?), *Cervus tarandus*, *C. elaphus*, *C. capreolus*, *Bison priscus*, *Bos primigenius*, *Equus caballus*, and possibly *E. asinus*.

Now it will have been observed that in the deposits of which I have been treating, the older group has been represented by only a few scattered remains, such as might have been introduced by the occupants of the caves from some older deposit in the neighbourhood, if they did not find them even in the caves themselves. A tooth such as the molar of an Elephant would be certain to

* See the Footnote at page 63, relative to the progress of denudation as calculated by M. Laganne.—Edit. Rel. Aq.

attract the attention of a savage accustomed to construct his weapons for the chase from bone or horn; and accordingly we find at Le Moustier and Laugerie portions of such teeth, and at Les Eyzies a portion of a tusk bearing traces of human work. The plates of the molars, however, are detached, suggesting that the teeth were already in a somewhat altered condition when deposited in the refuse-heap. The metacarpal of the large *Felis*, which I have mentioned as bearing cut marks upon it, I have not seen; but there is not much probability of the animal being represented by only a single bone, had it been killed at the time when these deposits were formed; and there is at least a possibility of cut marks being caused upon it by its being trodden in a mass of rubble all bristling with flint knives. We may therefore, I think, for the present regard all the remains of the older fauna as being of casual introduction—unless possibly some of those found at Le Moustier may be considered to have belonged to a deposit of another character than that of a mere "kjökken-mödding." Confining ourselves, therefore, to the second group, of some members of which the remains occur in such abundance, we still find that a vast change has taken place in the fauna of the country since these deposits were formed. The Reindeer, the Aurochs, the Chamois, the Saïga, have all now retreated, some to the extreme north, others to the forests of Lithuania or Moldavia, or to the snow-capped summits of the Alps or the Pyrenees. The *Spermophilus* has also disappeared. Whether we are to attribute this retreat to a change in the climate or to the advance of cultivation and the persecutions of Man, the process must necessarily have been slow. And yet, to judge from the fact recorded by M. Lartet, that no Reindeer-remains are ever found associated with the ancient Celtic monuments of Gaul, it would appear that the animal which formed the staple food of the occupants of these Caves had already disappeared from the South of France, even in an early prehistoric period. The absence of all domesticated animals, and even of the Dog, which has always been regarded as Man's earliest companion, also seems to testify to a great antiquity for these deposits. The fact, too, pointed out by M. Lartet*, that in a cave on Mont Salève, near Geneva, similar breccia occurs of charcoal and worked flints mixed up with fractured bones of Ox, Horse, and Reindeer, while Reindeer has not been noticed among the remains of any of the Swiss lake-habitations, seems to place these cave-dwellings earlier in point of time. It must, however, be borne in mind that they are in a district which, not improbably, civilization would be slow to reach, and that it does not *of necessity* follow that the extinction of the Reindeer in Switzerland and in the South of France was contemporaneous. The "bos cervi figurâ" men-

* Ann. des Sciences Nat. xv. p. 227.

tioned by Cæsar has, since the days of Gesner, been generally recognized as the Reindeer; so that less than 2000 years ago it was living in the Hercynian Forest; and though probably this forest was situate in Southern and Central Germany and not in France, yet it is worth recording as at all events a curious coincidence that some of the earlier authors place it near the Pyrenees*. On the whole, then, it would appear that the Palæontological evidence, though apparently fixing a limit in one direction, as tending to show the deposits to be more recent than the Post-Pliocene period, does not afford us any very precise indications in the other, though suggestive of what, historically regarded, must be considered a very high antiquity.

Looking at the subject from an Archæological point of view, it appears, first, that from the vast number of objects of human workmanship contained in the deposits, the accumulations at different spots must probably have extended over a lengthened period; and, secondly, that, from the different character of the flint implements found at Le Moustier, the beds there are of a somewhat different and probably earlier age than the others. I have already mentioned that though some of the implements found at Le Moustier approximate most closely to some of those from the Postpliocene gravels of the Somme valley, yet this form shaded off insensibly into another which has never been found in the river-gravels, though occasionally recurring, with but slight modification, in others of these cave-deposits. The other forms of flakes and scrapers are found, though with rather different accompaniments, at all the other stations along the Valley of the Vézère. Flakes, however, may be of any age; and the flake chipped at the end into a semi-circular form, to which the name of "scraper" or "*grattoir*" has been given, seems to come under the same category. They are sold at the present day for lighting tinder, are found on the surface, and in barrows and ancient encampments; and one has occurred even in the Brixham Cave. As to the date of the Le-Moustier implements, it will therefore be safest to suspend our opinion for the present. With regard to the objects from the other deposits, there are some which, if not giving a definite age, at all events seem to point to a definite stage of civilization; I mean the more carefully chipped implements and arrow-heads, of which a considerable number has been found at Badegoule, Laugerie, and the Gorge d'Enfer, and which are analogous in all respects to those of what may be termed the "ordinary Stone Period," such as have been found in so many places both in the superficial soil and in barrows. Some of these forms, indeed, are such as not improbably remained in use even after the introduction of the use of

* Smith's 'Dict. of Geog.' *sub. voce* (Schol. ad Dionys. Perieg. 286).

bronze. The presence in these refuse-heaps of skilfully carved bone arrow-heads and harpoons, of bone needles with neatly drilled eyes, and more especially of the sculptured and engraved bones, testifies to a considerable advance in civilization, and even in art, such as would at first sight appear more consistent with some acquaintance with metallic tools, rather than with cutting-instruments of stone alone. Of metallic tools of any kind there is not, however, the slightest trace—though it must be mentioned that a small piece of rough copper was found among the rubble thrown out from the cave at Laugerie Basse, which may nevertheless have been of accidental introduction from the surface. The Marquis de Vibraye has also found a small piece of copper in the "*foyer*," which he thinks is native. Still, judging from the archæological evidence *alone*, there is no reason why the presence of metal, if eventually found, should excite great surprise, as the majority of the deposits, so far as objects of human workmanship are concerned, might well be relics of a tribe subsisting by the chase, who, if not themselves acquainted with metal, *may* have lived at a period when in some not very distant but more favoured part of France the use of metal was already known.

Let us now see what is the testimony of other deposits containing human relics of a similar character in the South of France.

In the well-known cave of Bize* (Aude) were found portions of Reindeer-horn cut and carved†, some with a chevron-like pattern, worked flints, pottery, and human bones, mixed up with the fractured bones of Reindeer, Aurochs, *Ursus*, &c., together with numerous land and marine shells, principally of edible species. In that of Lourdes‡ (Hautes Pyrénées) Dr. Alphonse Milne-Edwards found bones of Reindeer cut by flint instruments, needles of bone, flint flakes and cores, mixed with fractured bones of Aurochs, Horse, Stag, Ibex, Chamois, Pig, &c.

In the lower cave of Massat (Ariège) were a number of arrow-heads, harpoons, needles, &c., made of bone or Stag's horn, accompanied by flint knives. With them were associated a number of fractured bones of Stag, Ibex, Chamois, and Aurochs, as well as a few bones of *Ursus arctos* and other animals. Besides these an antler of a Stag, perforated at one end, and having the head of a Bear engraved upon it, was found by M. Lartet§. There can be no doubt of the deposit in this cave having been a "kjökken-mödding," though regarded as of diluvial origin by M. Fontan‖.

In the Cave of Savigné¶ (Vienne) were found a number of worked bones and

* Marcel de Serres, 'Géog. des Terr. Tert.' p. 64; Lyell, 'Principles,' p. 738.

† Lartet, 'Ann. des Sc. Nat.' xv. p. 214. ‡ Lartet, *ibid.* xv. p. 227; A. Milne-Edwards, *ibid.* xvii.

§ Lartet, *ut sup.* p. 205. ‖ Quart. Journ. Geol. Soc. xvii. p. 468. ¶ Lartet, *ut sup.* p. 214.

flints associated with broken bones and cemented into a breccia. Among them was a barbed harpoon and the cannon bone of a Deer engraved with the figure of a Doe or Reindeer, followed by another animal of much the same appearance.

An analogous deposit in a cave on Mont Salève, near Geneva, has been already mentioned.

Now it will be observed that in all these instances, in which to all appearance precisely similar deposits to those of the Valley of the Vézère have occurred, the animals characteristic of the older or Postpliocene fauna are entirely absent.

In the Grotte d'Arcy* (sur Cure), described, though apparently under somewhat erroneous impressions, by the Marquis de Vibraye, there appears to have been a lower bed distinct from that immediately superimposed upon it, and containing remains of *Ursus spelæus*, *Hyæna spelæa*, and *Rhinoceros tichorhinus*, among which, however, a Human jaw was discovered. The bed above contained bones of Reindeer, Deer, Ox, and Horse, associated with flint knives. In this bed were fragments of a ring with notches in it; and its whole character seems much the same as that of the deposits I have been describing; so that it would appear as if we had here a case of superposition of the beds of what M. Lartet has termed the "Reindeer period" of the South of France upon an older bed. The Cave of Pontil (Hérault), described by M. Paul Gervais, presents an analogous instance. There the remains of *Rhinoceros tichorhinus*, *Ursus spelæus*, &c. are in a lower bed than that which furnished bones of Horse, Human remains, ancient hearths, a flint knife, and various instruments made of Deer's horn and bone, but in this case similar to those found in the Lake-habitations of Switzerland. Indeed some of the upper beds produced polished stone axes and objects belonging to the Age of Bronze.

Baron Anca† has remarked something of the same kind in the Grotta San Teodoro (Sicily), where beds containing siliceous flakes mixed with bones of Stag, Horse, and Pig overlie beds containing bones of Hyæna, Bear, Elephant, and Hippopotamus. In the Grotta Perciata the deposit of broken bones and flint flakes occurred, but without the remains of the older animals.

In the Cave of Bruniquel, from which the collection of objects now in the British Museum was procured, and which has formed the subject of a communication from Professor Owen to the Royal Society, as yet, however, incomplete‡, arrow-heads, harpoons, needles, and other instruments in bone, cut and engraved bones and Reindeer-horns, and various forms of worked flints, all similar to the

* Bull. Soc. Géol. de France, 2nd ser., xvii. p. 462. † *Ibid.* pp. 680–684.

‡ Since this was written, further communications have been made to the Royal Society by Prof. Owen.

objects from Les Eyzies, occurred in association with bones of Reindeer, Ox, Horse, and other animals, mostly in a fractured condition. We have not as yet the advantage of knowing what opinion has been formed by Professor Owen as to the age of the deposit, or what fauna he has been enabled to determine as belonging to the cave; but in a second collection from thence, which I saw at the *château* of the Vicomte de Lastic St. Jal, the explorer of the cave, were the base of a large canine tooth, probably of *Ursus spelæus*, and the tooth of a large Carnivore. There were also several marine shells, such as *Dentalium*, *Natica*, *Nassa*, *Pectunculus*, *Scalaria*, *Voluta*, and a *Cypræa* an inch in length, all not improbably derived from the Miocene beds of the Garonne. As several of these shells are perforated, it is evident that they were brought into the cave as personal ornaments; and this fact strengthens the supposition that in other cases remains of an older period, such as teeth of *Ursus spelæus* and Elephant, may have been introduced into the caves by their primitive human occupants long after the death of the animals. In some cases, as at La Madelaine, fossil shells have been found imbedded in the refuse-heaps. A shell of the genus *Cassis* has also been found at Les Eyzies.

On the whole, the evidence of all the caves which I have here cited as containing deposits of a similar character to those of the Valley of the Vézère is strongly corroborative of their belonging to a period subsequent to that of the *Elephas primigenius* and *Rhinoceros tichorhinus* and their Postpliocene associates, but characterized by the presence of the Reindeer and some other animals now extinct in that part of Europe, though they must have lived on to a period when some slight advance had been made in human civilization. For the works of Human Art found in these deposits show faculties of design beyond those of mere savages; and there is, moreover, for the most part, a definite character pervading them, so much so that, even with our present experience, there are a certain number of objects which may, with considerable confidence, be regarded as characteristic of what M. Lartet has termed the "Reindeer-period" in the South of France. It is indeed evident that outward conditions, and the means requisite for obtaining a supply of animal food, must react upon the manner of life of a people, and that this will in turn regulate the weapons and implements most in use, so that such objects will always be to some extent correlated with the fauna of the period.

I must, however, acknowledge that there are some instances of caves which, according to the observations of those who explored them, favour the view of weapons, implements, and ornaments of precisely the same character as those of

the "Reindeer-period" having been associated with the Postpliocene fauna. Such, for instance, is the upper cave at Massat*, where a bone arrow-head (I do not know of what form) is said to have been found in a deposit containing, among others, abundant bones of *Ursus spelæus*, *Hyæna spelæa*, and a large *Felis*. But the most remarkable cave is that of Aurignac, where a number of objects, of much the same character as those from the Caves of Dordogne (though without any barbed arrow-heads or harpoons), were discovered by M. Lartet associated with bones of *Ursus spelæus*, *Hyæna spelæa*, and *Rhinoceros tichorhinus*, and with teeth of *Felis spelæa* and portions of molars of *Elephas primigenius*, as well as with bones of Reindeer, Aurochs, Stag, Horse, &c. Future observations may serve to reconcile this apparent discrepancy; but in the mean time all geologists will be thankful to Messrs. Lartet and Christy for their careful researches in the Caverns of the Dordogne and for the liberal manner in which they have striven to make the results subservient to the interests of science. It is satisfactory to know that they are about to publish a profusely illustrated account of their discoveries; and it is hoped that this slight sketch of the impressions given by a visit of a few days may serve to show how interesting will be the details of the researches when recorded by those by whom they were undertaken. (See the Prefatory Remarks at page 161.)

* Quart. Journ. Geol. Soc. xvii. p. 468.

SKETCHES ON THE VEZÈRE. No. 4.

View of Le Roc de Tayac. Taken from the elevated ledge, by W. Tipping, Esq., M.P., F.S.A., May 1867.

This much excavated escarpment, opposite the Church of Tayac, still contains many chambers and galleries of an old Stronghold, hollowed out of the rock, as already mentioned at page 4. See also the Map at page 19, and the Woodcut, fig. 37, at page 64. The opening of a vertical passage leading to lower chambers is seen on the left.

Sketches in Dordogne No 1

Station IV.

Cave at Laugerie Basse, on the Vezère (Dordogne). See pages 5, 169, &c.

1. Ursus, sp.
2. Canis lupus.
3. —— vulpes.
4. Lepus timidus?
5. Elephas primigenius.
6. Equus caballus.
7. Cervus elaphus.
8. —— tarandus.
9. Bos, sp.
10. Capra ibex.
11. Antilope rupicapra.
12. —— saïga.

Station V.

Cave at the Gorge d'Enfer, on the Vezère (Dordogne). See pages 35, 170, &c.

1. Ursus spelæus.
2. Felis spelæa.
3. Canis lupus.
4. Canis vulpes.
5. Cervus tarandus.
6. Bos, sp.
7. Ovibos moschatus.
8. Capra ibex.

Station VI.

Cave of Cro-Magnon, on the Vezère (Dordogne). See pages 62 *et seq.*

1. Homo.
2. Ursus (of large size).
3. Felis spelæa.
4. Canis lupus.
5. —— vulpes.
6. ——, sp.
7. Spermophilus.
8. Lepus timidus?
9. —— cuniculus?
10. Elephas.
11. Sus scrofa.
12. Equus caballus.
13. Cervus elaphus.
14. —— tarandus.
15. Bos (Bison priscus?).
16. Capra ibex.

Station VII.

Cave of Les Eyzies, at the junction of the Beune and the Vezère (Dordogne).
See pages 5, 20, 36, 170, &c.

1. Homo.
2. Felis spelæa.
3. Canis lupus.
4. —— vulpes.
5. Elephas primigenius.
6. Lepus timidus.
7. Spermophilus erythrogenoides.
8. Arvicola, sp.
9. Mus.
10. Equus caballus.
11. Cervus elaphus.
12. Cervus tarandus.
13. Bison europæus.
14. Capra ibex.
15. Antilope rupicapra.
16. —— saïga.

XVII.

ON SOME BONE AND OTHER IMPLEMENTS FROM THE CAVES OF PÉRIGORD, FRANCE, BEARING MARKS INDICATIVE OF OWNERSHIP, TALLYING, AND GAMBLING. By Professor T. Rupert Jones, F.R.S., F.G.S.

[This Memoir was read at the Meeting of the British Association, August 1872, and before the Anthropological Institute, December 3rd, 1872; see abstract, 'Rep. Brit. Assoc.' for 1872, Trans. Sect. p. 189; and 'Journ. Anthrop. Instit.' vol. ii. p. 362.]

A remarkable specimen from one of the Rock-shelters in the Gorge d'Enfer, a lateral valley of the Vezère, Dordogne, is an oblong blade of ivory (much decomposed), 4 inches long by $1\frac{1}{4}$ at its widest part, tapering towards one end but imperfect, broken across at the other, convex on one face, slightly concave on the other, and marked on both sides with numerous, small, regularly arranged pits, several groups of more or less parallel cuts at and near the margins, and some minute notches on the edge at two places. See B. Plate XIII. figs. 13*a*, *b*, *c*, and page 98.

The minute marginal notching was possibly for ornament. The series of shallow cuts near the edges, and the systematically arranged pitting, on both faces, are very puzzling. The groups of cuts differ in direction, shape, and number; but in this some may see a character of value. It is difficult to say if the combination of oblique transverse lines of pits, almost quincuncial, was made on a premeditated plan. The several lines have not the same number of pits, nor is the arrangement of the latter vertically symmetrical. Though the isolated group of pits on the flat face (fig. 13*b*) gives *nine*, when counted either vertically or transversely, yet neither this nor the groups of notches constitute for certain any indication of a system of numeration; indeed we are not sure that they belong to any intelligible plan of marking; but we will point out some analogous objects and their probable uses and meanings; and perhaps our readers will help us to clearer interpretations. What appears to be a notch, or the segment of a hole, at the base is due to a recent fracture.

This ivory plate, or Implement, somewhat like a short Paper-knife of the present day, reminds us of the Smoothers, used in dressing skins, for flattening seams, and for a variety of purposes by Esquimaux and others. It may have been merely an ornament; or it may have been a Tally, or possibly a Gambling-implement, as Dr. Robert Brown, M.A., F.R.G.S., who is well acquainted with the habits of many savage tribes, is inclined to think.

Dr. R. Brown observes (in a letter dated Sept. 28, 1868):—"Always under correction, not having seen the original, I am very strongly inclined to believe that it was a Gambling-tool, used in much the same way as dice, the regular dotted markings, and possibly some of the transverse ones at the edge, being equivalent to the marks on dice, or having some reference to the chances of the game. How it was used, it is now impossible even to conjecture, so multifarious are the gambling-tools of savages at the present day.

"The Indians on the North-west Coast of America are inveterate gamblers, and, among numerous other contrivances, have a game called (by the Tsongeisth, near Victoria) 'Smee-tell-aew,' played with Beavers' teeth (the incisors). A blanket is spread on the ground; the number of players is two or three (generally two); and the gambling-implements are eight teeth, marked as follows:—two of them with one 'spot,' four with five, two with three sets of transverse bars, and one of the 'spotted' ones with a ring of leather. The teeth are tossed with a circular motion from the hand, and counted in pairs, each of which counts one; but if more than two of each kind turn up, it is counted as nothing. If two teeth, one with bars and another with spots, turn up, and one of them is the leather-marked tooth (or 'ace'), it counts double (four); and so on, until the counters (the leg-bones of Wild Ducks) are exhausted.

"I remember, in the summer of 1861, picking up (among other curiosities from the wild Eskimo of Pond's Bay, in Baffin's Bay) some beautifully polished pieces of Walrus ivory, with almost identical figures marked on them. I was then puzzled to make out their use, but am now convinced that they were gambling-tools, essentially the same in character with the Tsongeisth 'Smee-tell-aew.' There is no race of savages so rude that they have not some game of chance; and, indeed, it seems almost to be a rule that the gambling propensity bears an inverse ratio to their elevation in the social scale.

"During last summer (1867) I did not see any gambling among the Greenlanders; but they are now so far changed that no criterion can be drawn from them. They are (up to 72° N. lat. at least) a civilized race, though compelled by necessity to resort to a savage mode of subsistence.

"I doubt not that the old Cave-dwellers of Dordogne were also gamblers, and that, if the tool figured (fig. 13) on B. Plate XIII. is not a gambling-implement, others will be found."

Mr. Frank Poole refers to some Gaming-sticks used by North-American Indians, in his 'Queen-Charlotte Islands,' 8vo, 1872, pp. 319, 320, as follows:—

"The game was *Odd* or *Even*, which is played thus. The players spread a mat, made of the inner bark of the yellow cypress, upon the ground, each party being provided with from forty to fifty round pins or pieces of wood, five inches long by one eighth of an inch thick, painted in black and blue rings, and beautifully polished. One of the players, selecting a number of these pins, covers them up in a heap of bark cut into fine fibre-like tow. Under cover of the bark, he then divides the pins into two parcels, and, having taken them out, passes them several times from his right hand to his left, or the contrary. While the player shuffles, he repeats the words 'I E Ly yah,' to a low monotonous chant or moan. The moment he finishes the incantation, his opponent, who has been intently watching him, chooses the parcel where he thinks the luck lies for *Odd* or *Even*; after which the second player takes his innings, with his own pins and the same ceremonies. This goes on till one or the other loses all his pins. That decides the game"*.

§ I. *As to Shape.*—A plain bone knife (from Moosseedorf), the blade of which somewhat resembles our specimen, is figured in Keller's 'Lake-dwellings,' &c.,

* Specimens of the North-American Dice and Gaming-sticks are preserved in the British Museum and in the Christy Collection. In 'The Races of Mankind' (Cassell & Co.), Part II., p. 35, Dr. Brown has described a similar game.

Lee's Translation, pl. 14. fig. 22. Others have been met with in England (Heathery-Burn Cave; see 'Proc. Soc. Antiq.' ser. 2, vol. ii. p. 130, fig. 1); and, through the courtesy of J. H. Lamprey, Esq., Librarian of the Royal Geographical Society of London, we have seen several from Ireland, rather narrower and thinner, some with and some without holes near the end for suspension. Scorings perpendicular to the edge, whether accidental or intentionally made, are visible on some of these Irish and English specimens. See fig. 69, page 188.

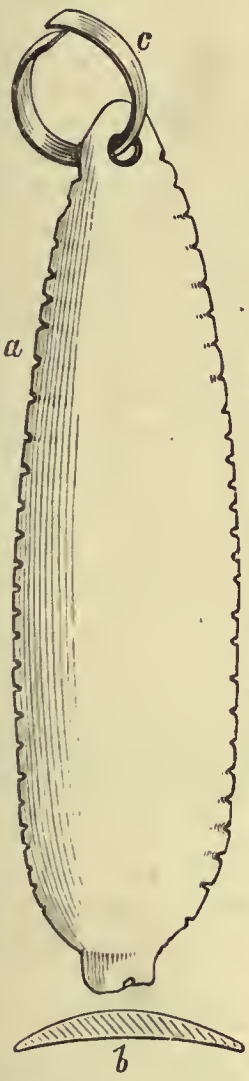


Fig. 64. Ivory Ornament or Implement from Central Africa, forming part of an amulet worn by Djibba Negroes. Natural size. (In the Christy Collection.)

a, The convex face. *b*, Section. *c*, The Iron Ring.

§ II. *As to the Marginal Notching.*—We know of no specimen like this one from the Gorge d'Enfer, combining the knife-like shape, the marginal crenulation, the scoring on the sides, and the pitting on the faces.

A more spatulate and blade-like bone implement from the Gorge d'Enfer (fig. 2, B. Plate XXV.) bears a notched or crenulated edge and some superficial scorings.

A symmetrical and perforated blade-like piece of ivory (Woodcut, fig. 64), with an iron ring, forming part of an Amulet*, used by the Djibba Negroes of Central Africa, though more neatly elongate-ovate, closely corresponds in shape with fig. 13, of B. Plate XIII., except that the broken narrow end in fig. 13 is replaced by a perforated apex in the modern specimen; and instead of the notched base of fig. 13, we have in the other a broken projection. The margin of the African specimen is neatly notched all round; but the notching is coarser than the partial crenulation of the edges in fig. 13 of B. Plate XIII. The African specimen bears neither pits nor scoring; nor can we offer any remarks on its original shape and use before its narrow projecting portion was broken off, if ever, indeed, it was more complete than at present, or if ever intended for any thing else than an article of Fetish. We get from this, therefore, little to

* Consisting of some cowries, leg-bones of a small reptile, a large seed-vessel, and this ivory plate, all strung on a leathern thong.

illustrate the character and use of the Dordogne specimen, excepting that ivory has been cut into somewhat similar shapes by peoples far removed in time and space.

Colonel Lane Fox, however, has shown us a wooden knife, from Central Africa, of nearly similar outline, with crenulated edge and long handle (fig. 65); and he

Fig. 65.

Fig. 66.

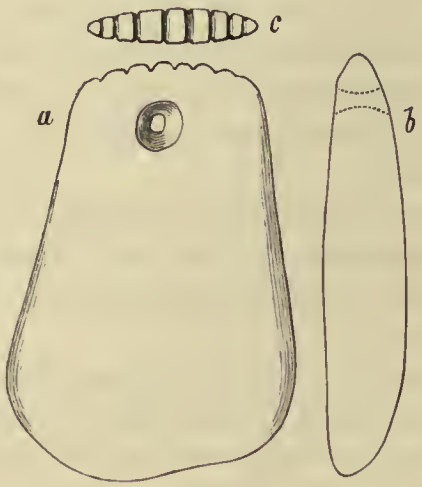


Fig. 68.

Fig. 67.

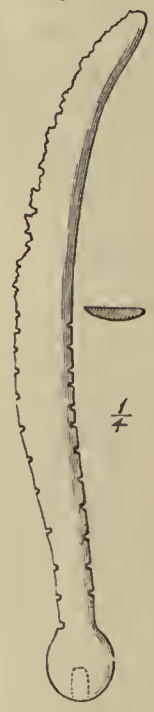


Fig. 65. Knife of very hard dark-red wood, described as a "Woman's Knife" of the Dor Tribe of Negroes. Brought to England by Mr. Petherick. It is notched along both edges, at nearly regular intervals of about $\frac{1}{8}$ of an inch, at right angles to the line of the edge. One fourth of nat. size. (Col. A. Lane Fox's Collection.)

Fig. 66. Notched Stone Implement. From Pennsylvania. (Col. A. Lane Fox's Collection.)

Fig. 67. Knife of Walrus Tusk (probably Esquimaux), notched at irregular intervals along the edge. It has a hole $\frac{3}{4}$ inch deep in the back of the handle. One fourth of nat. size. (Col. A. Lane Fox's Collection.)

Fig. 68. Scored Stone Implement. From Denmark. (Col. A. Lane Fox's Collection.)

suggests that this ivory specimen may have been an old knife, broken from its handle, and subsequently bored at the tip for suspension. M. J. C. Buckley, Esq., Member of the Celtic Society, has moreover informed us that a short broad knife with a crenulated edge is commonly used in the South of Ireland to scrape roots (potatoes, carrots, &c.) into a pulp for culinary purposes.

§ III. *As to the Parallel Cuts.*—With regard to the *scoring* on our specimen (B. Plate XIII. fig. 13), we have the following remarks to make.

1. We find some linear transverse notches on the above-mentioned bone Implement (fig. 2, B. Plate XXV.) from the Gorge d'Enfer, which is not without some resemblance to fig. 13 of Plate XIII. It is a flat piece of bone, convex on one face, partly flat and partly concave on the other, rounded at one end, and broken at the other, which is narrower. The margin is smooth and rounded, and marked throughout nearly all its unbroken extent with numerous, small, transverse, parallel nicks, forming a crenulated edge, such as we see in fig. 13 under notice, and much finer than that given to the transversely notched teeth in B. Plate V. figs. 7 and 8. This ornament is lost on the rounded end, possibly from wear. On each face, at the narrower portion of this blunt bone blade, are some cross scorings; but the fracture has interfered with the several series of notches, some of the smaller of which are in pairs. These groups of marks were evidently intentional; and this specimen, as far as general form, crenulated edge, and scoring are concerned, has an evident relationship with fig. 13 of Plate XIII., and came from the same place.

2. Many articles made for different purposes, in different countries, have notched edges, whether for use or ornament (see, for instance, fig. 89, page 18, of Worsaae's 'Nordiske Oldsager' &c., 1859). In the Blackmore Museum, Salisbury, Mr. E. T. Stevens has shown us a very handsome, mounted, jade adze marked with notches that are arranged in groups chiefly along the edges; and Mr. J. Evans, F.S.A., has another, from New Zealand, and a fragment of a stone celt from Burwell Fen with numerous parallel incised lines, or scorings, on the two edges of one face.

Besides the sketch (fig. 65), Colonel Lane Fox has favoured us with sketches of other notched and scored specimens in his collection:—1. A celt-shaped implement of basalt, from Pennsylvania, with a hole drilled from both sides, and eight notches across the small end or butt* (fig. 66). 2. A knife of Walrus-tusk, with irregular notches, possibly for the handle (fig. 67). 3. An oblong, hard, black stone, from Denmark, regularly notched with fine lines at eight places (two places on each of the four edges), with 7, 8, 9 (three times), 10, 11, and 12 notches (fig. 68). Could this, asks Colonel Lane Fox, have been intended for gambling-purposes?

3. Of bone implements scored with marks that scarcely seem intended to be ornamental, and may have served originally for numbers, or other private marks, many specimens may be adduced. We may draw attention to a knife-like bone

* These may possibly have had to do with the fastening of the handle. See also 'Proc. Soc. Antiq.' ser. 2, vol. i. p. 281 (1860)—W. Galloway, on an incised ironstone celt from near Edinburgh, with notches, longitudinal and transverse, at the heel for fastening.

Implement, not dissimilar to some from Switzerland and elsewhere (see above, page 185), that was found in the Heathery-Burn Cave, near Stanhope, in the County of Durham, which bears a scoring, or groups of notches, on the edges, as observed by A. W. Franks, Esq., F.S.A. (fig. 69). At one edge there is a set of two short parallel notches perpendicular to the margin, and another of three, close by; and these appear on one face only. The other edge has two series of similar notches (eleven and thirteen) continued on the two faces of the blade. The specimen is 8 inches long by $1\frac{1}{4}$ broad, and about $\frac{1}{6}$ thick. There is a figure of a specimen like this, reduced in size, and without markings, accompanying an account of the Heathery-Burn Cave* and its contents, in the 'Proceedings of the Society of Antiquaries,' ser. 2. vol. ii. p. 130.

Fig. 69. Bone Knife or Tally-stick. From Heathery Burn. Half nat. size. (*From a Sketch by A. W. Franks, Esq.*)

4. The Rev. W. Greenwell, F.S.A., has observed groups of three, five, and seven notches or lines, of unequal lengths, perpendicular to the edge, on one of the perforated implements made of Red-deer Antler, from Heathery-Burn Cave, and not uncommon in England and Switzerland, which have been regarded as analogous to Shuttles &c., such as those figured in Keller's 'Lake-dwellings' (Lee's Translation), pl. 37. figs. 11 & 13; pl. 41. fig. 9; and pl. 62. fig. 27.

5. The marginal scoring on a knife-like bone implement from Ireland has been alluded to above, page 185.

6. Marginal scoring, or groups of small notches perpendicular to the edge, we have also seen on two edges of a fragment of a flattish bone stem, subtriangular in section (a Dart-head, perhaps, or rather a Tally-stick), from the rock-shelter of La Madelaine, Dordogne (fig. 3, B. Plate XXV.). Here there are two perfect groups of four notches on one edge and part of another, and an imperfect series of eleven, at somewhat irregular distances, on another†.

* This Cave is also described in the 'Geologist' for 1862, pages 34 and 167; and some of the Human Remains found in it are described and figured in the same volume.

† Specimens of implements made of antler, and so notched or scored as probably to have served as Tallies, have been collected by MM. G. & P. Parrot, in the Grotte de l'Eglise, Commune d'Excideuil (Dordogne), and are preserved in the Museum at St. Germain.

7. Two fragments of small, subcylindrical, hollow Bird-bones, also from La Madelaine, have vertical rows of transverse parallel notches, and probably served as Tally-sticks: in one instance (fig. 6, B. Plate XXV.) there are two vertical rows (in ones, twos, threes, and greater numbers, not far apart) on the two opposite sides, where the surface of the bone is most prominent; and in the other specimen there are four, less regular rows, occupying all the surface. The latter, however, is possibly a mere roughening of the smooth bone to ensure tight lashing (compare figs. 1 and 10 of B. Plate XIII.); but the former seems far too simple to have been intended for that purpose. A piece of a solid stem of a Dart-head (?) from the Gorge d'Enfer is also scored all over with small transverse marks with an almost alternate arrangement, and hence probably intended for ornament.

8. On the edge of a perforated and carved antler figured in B. Plates XV. & XVI. (fig. 1, described at page 103) there is a scoring of upwards of thirty slight but distinct transverse notches, in different groups, at varying distances. See also Woodcut, fig. 20, page 103, and B. Plate XXV. fig. 1.

This was the shed antler of a young Reindeer, or perhaps of a doe, judging from the small size of the base. The stem or beam has been cut away laterally, so as to present two flat faces, the convex edge of which still bears the bases of three truncated branches at unequal distances. The stem appears to have lost some of its length by an old fracture. The convex edge is marked with a scoring of numerous (thirty-three) slight transverse notches—some at equal distances apart, some more widely separated, and a few in pairs. The two broad and flat surfaces are grooved with two chief lines from base to top; and secondary groovings follow the contours of the projecting stumps. Four holes, of unequal diameters, are pierced in the wide portion, from the brow-antler to the third branch or "royal" above. Four is the greatest number of holes we have yet met with in these implements (see also B. Plates III. & IV. fig. 5). The specimen under notice may possibly have been part of an apparatus for the suspension of several articles, either on the person or in the dwelling; and if there were a pair of such specimens fixed in a wall, side by side, they would serve as a rack for arrows*. The scoring on the edge, however, would rather point to this implement being of personal use as an ornamental Tally-stick.

North-American Indians and other savages notch sticks as Tallies, for scoring†

* Besides the above-suggested purposes for these perforated horns, and the others mentioned at page 102, we find that they have also been regarded as possibly fitted for bridle-harness and sledge-gear ('Geological Magazine,' vol. vi. p. 278). In Hindoostan ropes of bark are twisted, with perforated sticks.

† Thus the words a "score" of things, "scoring" a game, "scoring" an account, "scoring" music,

games, counting days of travel, and such like; and they mark their weapons to enumerate enemies slain or prey captured (see above, page 47): Mr. Lamprey informs me they nick their rifles for good (and sometimes for bad) shots; and even the more civilized hunters and trappers do the same. Thus also an ardent schoolboy notches his cricket-bat in memory of good "hits" and "runs."

Mr. T. K. Gay has kindly drawn my attention to an interesting Esquimaux specimen in the Christy Collection, bearing what may be Tally-marks. It is a wooden sheath for the head of a Whale-dart or Harpoon, from Cook's River, Russian America. It is made of two pieces of wood, hollowed and laid together, and tied with sinew string in two places. This sheath has four notches on one of its edges, cut since it was made; and they possibly stand for four Whales killed. This sheath would fit such an Harpoon-head as that shown in fig. 78, page 196.

Though it is long since "our forefathers had no other books but the Score and the Tally"* (*Jack Cade* in 'Henry VI.' Part 2, Act iv. Sc. 7), yet we know that Tally-sticks were used in the Exchequer accounts until a recent period†. At Riga and elsewhere Tallies are still used in taking in and discharging a cargo; and Mr. S. R. Pattison has seen them used in loading minerals in Andalusia. In loading carts with turf in Ireland, and on other occasions, Tally-sticks are still sometimes in requisition; indeed M. J. C. Buckley, Esq., Member of the Celtic Society of London, informs me that in some parts of the south of Ireland Tally-sticks and Tally-boards, either of wood or slate, and either notched or otherwise marked, are frequently used in noting loads and other quantities of Corn, Hay, Potatoes, and Turf, barrels of Beer, firkins of Butter, pails of Milk, &c. See fig. 70, page 192.

"scoring" a piece of roasting-pork, glacial "scoring" of rocks, old "scores" of injuries to be revenged, a favour granted on the "score" of kindred, &c., also "scaur," "scar," "scarify," &c. have evidently a close relationship. Thus also:—"All shall eat and drink on my *score*" (*Jack Cade* in 'Henry VI.' Part 2, Act iv. Sc. 2); "Do you owe me nothing on that *score*?" (Dickens's 'Little Dorrit'); "A clear *score* between us" (Dickens's 'Battle of Life'); and "Start off on a *score*," and "Death clears old *scores*" (Barham's 'Ingoldsby Legends').

* An interesting remark as to scoring or notching being available as means of intercommunication, has been copied for me by Mr. T. K. Gay from "Some Notes on the Ainos," by A. S. Bickmore, in the 'Transactions of the Ethnological Society of London,' New Series, vol. vii. 1869, p. 22:—"They have no written characters. The only approach to such a thing, of which I was able to hear, was that in the southern part of Saghalien the old men can send information to each other by notching sticks in a peculiar manner; but only the old men can understand what is meant by this notching." Colonel A. Lane Fox remarks on intelligible signs and signals among the Esquimaux, in his memoir "On Oghams" &c. 1867.

† See remarks on Tallies, in 'Notes and Queries' (1st series, vol. x. p. 485; vol. xi. pp. 18, 95; and 3rd series, vol. x. pp. 197, 307, 382); on Music-scores, *ibid.* 2nd series, vol. xii. p. 416; and on Masons' Marks, *ibid.* 3rd series, vol. xii. pp. 431, 514. A "Tallyman" now sells on a running account.

See also the 'Journal of the Anthropological Institute,' January 1873, vol. ii. p. 364, where Mr. Buckley adds:—"The system of marking is by *fives*. When the scores are equal in playing ball, the local expression in Cork is 'all aboard.' The adage, 'it *tallies* with' something else, is from the fact of the scores on either side of the Tally-stick or -board being equal."

"Among the people of the Himalaya mountains," says Dr. Campbell, *op. cit.* p. 364, "the 'tally' is in constant use in the occupations of ordinary life. A 'sirdar,' or head man of coolies, keeps a 'tally' to enable him at the end of the day to give his master the number of men present; so in woodcutting, &c., a man will have a 'tally' to show the number of logs delivered, &c., ... kept . . . . generally on a piece of stick cut in the jungle, and thrown away when the work is paid for. There are various ways of keeping a 'tally:' a long notch may indicate 5, 10, or 20; so 5 notches, with a notch across, may stand for 10 or 20, as the case may be."

In the same Journal, *loc. cit.*, A. W. Franks, Esq., describes an interesting *aide-de-mémoire*, or carved stick, bearing numerical indications, made for a definite purpose by the New-Zealanders.

"There is preserved in the British Museum an object of another kind, the use of which it would not be easy to discover had it not been accompanied by a description of its meaning. It is a wooden staff, 3 feet 4¾ inches in length, surmounted by a figure, and covered with designs of the usual New-Zealand pattern. Down one side are eighteen projections, of which the fifteenth is inlaid with a piece of green jade. It was obtained in New Zealand by His Excellency Sir George Grey, who states it to record the history of the Ngati-Rangitiki tribe, and to have belonged to a chief named Te-Rorokai, who used it to aid his memory when recounting the history of the tribe."

Fig. 71 (p. 192) is a reduced sketch of a Burmese Tally, presented to the Christy Collection by J. M. Foster, Esq., F.S.A. It consists of a narrow piece of Bamboo rind, carefully split into ten longitudinal strips; and these are notched across at regular intervals into sections (ten remain in this specimen). It is stated that "one of the 100 sections is broken off as the article passes the tally-keeper, and the remainder is handed in to account for the number passed."

Gamekeepers with us are in the habit of cutting notches on a stick to keep account of the number of game killed during a shooting excursion, different notches being made for different kinds of game. In Wales, Cornwall, and elsewhere labourers keep note of work done and wages due on sticks, with different circles for different coins, and notches against them in the required numbers, or with notches of different sizes and lengths for the several moneys and portions of time: these are sometimes produced before Magistrates in proof of claims for earnings. A Mexican shop-score is figured in E. B. Tylor's 'Anahuac,' 1861, p. 87.

Fig. 72 (p. 192) illustrates a modern English flat Tally-stick*, belonging to a

* Somewhat similar, but more complex, notchings on the edges and faces of a four-sided stick constituted the chief character of the runic primstaff, runic calendar, clogg, and suchlike stick almanacks of olden times: Dr. Plot's 'Nat. Hist. Staffordshire,' 1686; J. Brady's 'Clavis Calendaria,' 2 vols. 8vo, 1812; Dr. J. B. Davis's memoir in 'Archæologia,' vol. xli. 1867; also 'Proc. Soc. Ant.' i. pp. 51, 284, and n. s. vol. i. p. 274 (a Tally).

Turf-cutter, or Broom-maker, or perhaps a Shepherd, lately picked up on the heath at Wishmoor, near Bagshot, on the confines of Berks and Surrey, by C. Cooper King, Esq., R.M.Art.

Fig. 71.

Fig. 70.

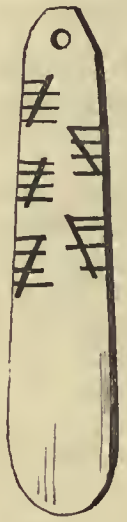


Fig. 72.

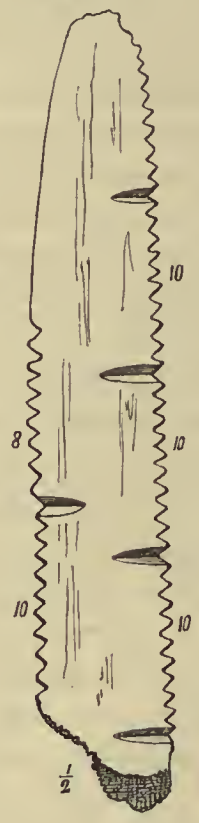


Fig. 70. Tally-board* used in the south of Ireland. Reduced. (*From a Sketch by M. J. C. Buckley, Esq.*)

Fig. 71. Burmese Tally. Two thirds nat. size. (In the Christy Collection.)

Fig. 72. Tally-stick from Wishmoor, Surrey. One half nat. size. (In the Christy Collection.)

In reply to an inquiry on the subject, G. D. Atherstone, Esq., of Graham's Town, South Africa, has obliged me with the following:—"I find that the native shepherds in the Cape Colony keep a Tally-stick on which they make a score for every sheep that dies. There is generally one herd to each flock of 1000 sheep;

* In Hogarth's picture of the Distressed Poet the milk-maid presents a heavily scored Tally-board, of an oblong shape, broader than fig. 70, to the poor moneyless man.

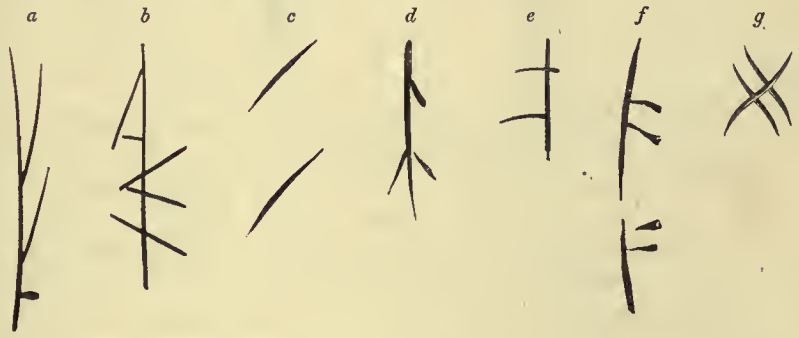
and by means of these Tally-sticks they keep an account of the number of sheep that die. Also during shearing-season each man keeps an account, by means of notches or cuts on pieces of wood, of the number of sheep he has shorn. Besides these, I do not know of any Tally-sticks in use amongst the natives; and these may have been introduced by Europeans."

9. On a small lanceolate weapon-point with a notched base, such as figs. 5 and 6 in B. Plate XIII. (and, like that, also from the Gorge d'Enfer), we see small notches crossing each edge, but not continued on the faces: on one edge sixteen, irregularly paired, are visible on one edge; and only six remain on the other (broken) edge: see fig. 2, B. Plate XXVI. It is possible, however, that these numerous small transverse nicks were intended to serve for a kind of barbing, to make the weapon hold better; or they may have been for poison; or they may have been Marks of Ownership.

10. Such Marks of Ownership as we see on the bone Arrow-heads of the Esqui-

Figs. 73*a–g.*

Esquimaux Owner-marks on Harpoons. (In the Christy Collection.)



maux, figs. 73*a–g*, and on Colonel A. Lane Fox's Australian Club, fig. 74 (p. 194), are not uncommon on weapon-heads from the Caves of Dordogne* and elsewhere. Such a mark, consisting of three parallel oblique notches, is found on the side or

* Colonel A. Lane Fox, F.S.A., in a Memoir ('Archæological Journal,' No. 94, 1867) on the "Oghams" inscribed on stones found in Ireland, has noticed the ogham-like appearance that many of the Esquimaux marks of ownership have (p. 9, and figs. 1–32); and he notices the occurrence of similar primitive scorings on ancient Danish bows. The inscribed implements, alluded to above, from the Dordogne Caves indicate a still higher antiquity for the use of such markings, as is indeed almost anticipated by Colonel A. L. Fox at page 12 of his memoir. See also 'Trans. International Congress Prehist. Archæol.' 1868, pp. 313–316.

We may add that in Stokes's 'Discoveries in Australia' &c., 1846, fig. 30 (in the plate opposite page 170) represents some ogham-like and other markings in use among the Australian savages, and very similar to those above alluded to.

edge of a subcylindrical weapon-point from Laugerie Basse (fig. 8, B. Plate XXVI.); and a similar mark of four large and two small oblique parallel cuts, occurs on a similar implement from Massat (Ariège), fig. 75. In M. Lartet's collection is an

Fig. 75.

Fig. 74.

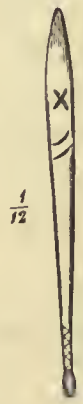


Fig. 76.

Fig. 77.

Fig. 74. Australian Club, with Marks of Ownership. Reduced. (In Col. A. Lane Fox's Collection.)

Fig. 75. Owner-mark (?) on a Dart-head, from Massat, France. (In the Christy Collection.)

Fig. 76. Butt of an Harpoon-head, with Owner-mark, from Dordogne. (In M. Lartet's Collection.)

Fig. 77. Edge-view of an Esquimaux Bone Arrow-head, with Owner's Mark. (In the Christy Collection.)

Harpoon-head from one of the Caves of Périgord, with four parallel oblique cuts on one side, just above the collar or bulb (fig. 76). A similar weapon in the Christy Collection bears a single oblique cut or notch in the same position. The eight bold oblique cuts, also, on fig. 6, pl. 13, 'Ann. Sc. Nat.,' ser. 4, vol. xv., from Massat (Ariège), may rather be inscriptive than ornamental *. A pair of small, oblique, narrow notches, and a series of three larger oblique notches, just below, mark one edge (B. Plate XXVI. fig. 7*b*) of a Dart-head (oblong in section) from

* See 'Quart. Journ. Geol. Soc.' vol. xvii. p. 470, fig. 4.

La Madelaine; whilst the opposite edge (fig. 7 *a*) is ornamented with bold, deep-cut notches, both straight and oblique, in an irregular chevron pattern*.

On the Dart-heads and other implements already figured in this Work we may see several groups of notches, more or less systematically arranged, such as:—the five notches, alternately long and short, remaining on the broken specimen, fig. 8, Double Plate B. VII. & VIII.; three curved notches, deep and broad, on the upper part of fig. 2, B. Plate IX.; two sets of a transverse line and a cross† on fig. 6, B. Plate X.; the transverse scorings repeated in fives, with similar spacings, on the pig-heads (?), placed snout to snout, in fig. 7; the three oblique lines associated with a chevron in fig. 9; and four faint scratches (probably accidental) on fig. 11, B. Plate XII.

So also the Esquimaux mark of an oblique notch crossed with either one or two her oblique notches is found on t he Dart-heads from La Madelaine. Thus near he point of one specimen, fig. 4, B. Plate XXVI., we see four such crosses, two ymmetrical, and two lower ones crossing less and less centrally. Two such oblique notches crossed by four others, but with deeper and broader cuttings than the foregoing, form the mark (or ornament?) near the butt-end of a Dart-head from La Madelaine, fig. 6, B. Plate XXVI.; and a more complex pattern, consisting of a row of six short, broad, oblique notches (like adze-heads), each associated with a short thin line meeting its middle on one side (like handles), is found near the butt of another Dart-head from the same place, fig. 3, B. Plate XXVI. See also fig. 5.

The Esquimaux bone Arrow-head, fig. 77, with Owner-mark, is especially of interest, as the pattern is essentially similar in style to that on figs. 1, 10, and 11, and remotely to figs. 3 and 5, B. Plate XXVI., namely transverse oblique notches either parallel or at different angles.

The Whale Harpoon-head represented, in reduced outline, by fig. 78 (p. 196) is very neatly cut out of black Slate, and bears the private mark of its Esquimaux owner. On one face (fig. 78 *a*) are two parallel longitudinal incised lines, with interrupted line and dots between, near one edge. The other face (fig. 78 *b*) has a simple longitudinal line, near the other edge. Such a spear-head would fit the notched sheath mentioned above, at page 190.

* Bone Implements bearing ornamental patterns, besides marks possibly intended for numeration or for recognition, have been obtained also from M. de Lastic's Cave near Bruniquel (Tarn et Garonne); see remarks by A. W. Franks, Esq., F.S.A., 'Journ. Anthrop. Instit.' vol. ii. p. 364.

† Similar to a mark, from an ancient Danish bow, figured by Engelhardt and in Colonel Fox's Memoir, pl. 3. fig. 27, referred to in the footnote at page 193.

Fig. 78.

Slate Harpoon-head*. Two thirds real size. (In the Christy Collection.)

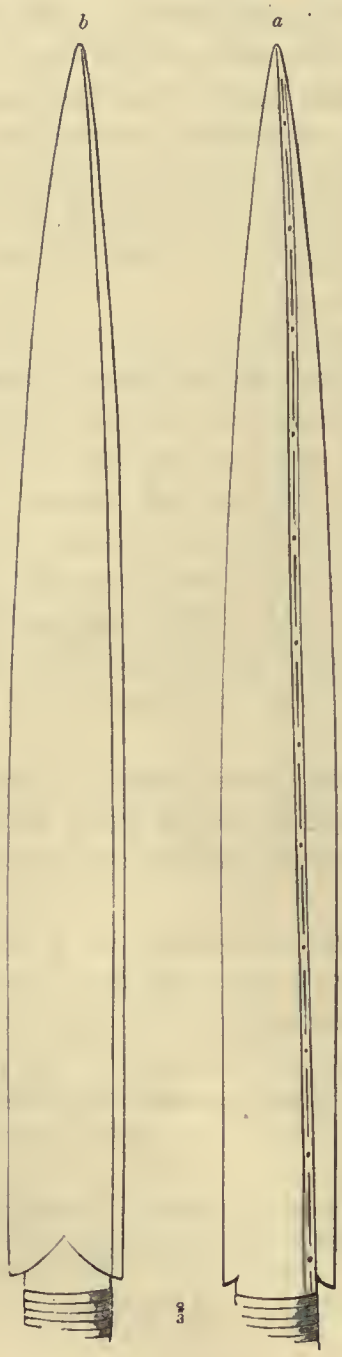


Fig. 79.

Irish Spade, with Owner-marks. Reduced. (*From a Sketch by M. J. C. Buckley, Esq.*)

a, Front view. *b*, Back view.

The whole Implement is $4\frac{3}{4}$ feet long; the Spade itself, about 1 foot long, is tipped with steel.

* See also 'Matériaux pour l'histoire de l'Homme,' vol. vi. p. 142, figs. 63, 64.

These Esquimaux specimens have been especially pointed out by Mr. T. K. Gay, who has also favoured me with extracts from various writers bearing on this and other subjects. For instance, with regard to the marked Harpoons (although it is not the long form seen in fig. 78 that is referred to, but much shorter and leaf-shaped or lanceolate points) the following extract is very illustrative :—

Urey Lisiansky's Voyage round the World in 1803–6 (Lond. 4to, 1814), p. 206 (island of Cadiack):—"The whale-harpoon is about ten feet long, the spear or point is of slate-stone, and of the form of a knife, sharp on both sides, and is set loose into the handle." Page 202:—"A Cadiack whaler in a single bidarka attacks only small whales; and for this purpose he is provided with an harpoon, the spear of which is made of slate-stone, and so fixed into the handle as to detach itself when the whale is struck. When wounded by it, the whale runs to sea and dies, and is perhaps never seen again, unless the currents and winds should throw it on the coast. Thus no whaler is sure of his prey. The spears of the whale-harpoons are marked by the whaler, so that every one knows his own" *.

With regard to Owner-marks, Mr. Buckley observes (Journ. Anthrop. Instit. vol. ii. p. 364) that "the handles of spades and sticks in Cork and Waterford are often *marked* with notches as in the Australian club exhibited by Colonel Lane Fox (see page 194, fig. 74). The expression 'I put my *criss-cross* on it,' used by the peasantry, is from this custom, so that the owner, being unable to read†, could always claim his own stick or spade by its marks. The way of mounting the spade which is in use in the stony districts of the south-west of Ireland is precisely similar to the way in which the so-called bronze 'celts' or hatchets of the ancient Irish were fastened to their handles" (fig. 79 *a* and *b*).

The Trade-marks and Brands, now so common on manufactured articles and in advertisements, though sometimes elaborate in design, are, of course, essentially Owner-marks‡; and so were the old Merchant-marks§, such as are indicated in the 'Proceed. Soc. Antiq.' ser. 2, vol. i. p. 202. The old Masons' Marks, of the XII.–XV. Centuries, were somewhat similar; also their modern "Banker-marks."

Owners' Marks, Heraldic Devices, and Monograms slide into each other, and,

* The American and British whalers also mark their harpoons with the conventional sign adopted for their ship, so that, if the whale escapes and is afterwards captured with an old harpoon in it, it is known from the crew of what vessel it had escaped.

† Branding their tools with letters is now the nearly universal custom with labourers, artisans, and others.

‡ So also we may refer to the farmer's ruddle-marks on his Sheep, the brand on the flanks of hill Ponies and on the hoofs of cavalry Horses, the ear-cuts and other marks on Sheep turned out on commons, and on colonial Horses and Cattle, the butcher's varied knife-scorings on carcasses, and the nicks on tame Swans' bills. For the last see 'Archæologia,' vol. xvi. (1812), pls. xi.–xiii.

§ S. R. Pattison, Esq., F.G.S., who has favoured me with notes on Tallies and Owner-marks, refers me to 'The Statutes at Large' (edit. "Record Commission") for information as to the recognition of special marks in some of the earliest statutes respecting manufactures, cattle, &c.

not only for individuals, but also for whole tribes, are marks or figures made as distinctive signs, either on their weapons or persons—and this not merely after the fashion of the "Totem" of the North-American, or the "Plaid" of the Highlander, but by a more definite sign-manual*, such as is described in the following extract from "The Red Men of To-day" (especially in Colorado), 'Chambers's Journal,' Series 4, No. 463, November 9, 1872, pages 725 and 726:—

"Each tribe, as has often been told, has its distinctive signs, but I had no idea that these were carried into minute details. No Ute arrow can ever be mistaken for an Apache arrow, or *vice versâ*. One always has a rounded point, or rather end, the other always a sharp one; and on the wooden shaft of the weapon are signs, telling to the initiated what tribe it was discharged by. This last sign consists of a sort of zigzag line in each case, but being large and small in different places according to the tribe. The Ute always makes his zigzag large in the same spot, dwindling almost to a straight line in others; while the Apache has his traditional carving; and from these rules they never deviate. As for exchanging marks! why, an Apache will not allow the Ute sign to be drawn in his presence—as I once discovered by the actions of a strapping young warrior, a son of the great Apache chief José Largo. This young man, by-the-by, said his name was Juan; so I asked him what it was in Indiano, and he told me 'George.' I had my doubts. He drew the Apache sign readily enough, but would not touch the Ute; and when I tried to show him, he put his hand heavily on the paper, and said 'No! No Ute!' and as I persevered, he grew more vociferous, till I judged it best to give in. The tribes have, of course, their characteristic paints; and hideous enough they look in them. The Utes paint three white bars on each cheek; the Apaches, three black ones: that is, they do so when they are very careful; sometimes it appears merely a few daubs of white or black paint. The Ute colours are much more awful and ghastly than the Apaches', as on their brown skins black does not make so frightful a contrast as does white."

11. Other and different instances of what may have been the private mark of the primitive Hunter occur on at least two of the large subcylindrical Dart-heads with wedge-like butts†, such as are figured in B. Plate IX. figs. 2 and 7. These curious inscriptive markings (if not imperfect attempts at definite patterns) consist of sixteen or seventeen shallow transverse cuts at various angles, rarely perpendicular to the edge, but sloping parallel with, or, more often, towards each other (but without crossing), like a row of imperfect V, Λ, M, and Ns, irregularly arranged, see figs. 10 and 11, B. Plate XXVI.

12. Some of these, as well as the more elaborate carvings, may have been idle whittlings; some, very probably, were signs of Ownership; and it may be that some at least of the marks and signs above described or alluded to had the value of a Charm in the eyes of the Aborigines—an idea well expressed by

* "Hast thou a *mark* to thyself?" (*Jack Cade* in 'Henry VI.' Part 2, Act iv. Sc. 2).

† We may mention that, of course, we do not allude to the scoring on the bevelled faces of the butt-ends, which have been cut down and scraped with flint tools, and afterwards scored over for firmer fixing in the haft.

Mr. William Morris in his Poem "The Life and Death of Jason"*, where, speaking of an arrow, with iron head and carved stem of wood, that had been shot by Natives on shore against the Argonauts, he says:—

> But Jason from the mast the arrow broke,
> That erewhile had so scantly missed his life,
> And found it scored as by a sharp-edged knife,
> From barb to notch, with what seemed written words,
> In tongue unknown to aught but beast and birds.
> So when Medea saw it, straight she said:—
> "Fair love, now praise some God thou art not dead,
> For from the Cimbrian folk this arrow came,
> And its sharp barbs within a wizard's flame
> Were forged with peril, and the shaft of it
> Was carved by one who in great fear did sit
> Within the haunted places of the wood,
> And tears are on its feathers, and red blood."

§ IV. *As to other Markings, ornamental or otherwise, on some Implements.*—Besides the Dart-heads and other articles bearing marginal scorings, we meet with stick-like implements that are crossed with lines at more or less regular intervals, some also having short deep notches along the edges, both kinds having probably been used as Tally-sticks and Gambling-scores.

1. Such is the fragment of a narrow flat implement, made of antler, from Aurignac, described and figured in the 'Ann. Sc. Nat.' ser. 4, vol. xv. pp. 189 & 251, pl. 11. fig. 7, with its two rounded crenulated edges (18 notches on one edge, and 19 on the other, in obscure groupings), and with one of its faces marked with the remains of two regular series of incised lines reaching from edge to edge, but not corresponding to the little marginal notches. Figure 5, B. Plate XXV., also belongs to the same category, bearing perhaps the score of some game.

2. From La Madelaine we have an imperfect, flat, tapering implement of carved antler, figs. 4 *a–c*, B. Plate XXV., bearing on one side eleven straight, more or less deeply and broadly cut lines reaching across, with pairs of badly cut suboval cipher-like outlines alternating with eight of them; and on the other face there are only six, transverse, shallow and curved lines towards the thinnest end. The four angles are strongly notched at rather irregular intervals, with five or six notches each; and the cut lines rarely correspond with these.

* London: Bell and Daldy. 1867, 8vo, p. 180.

It is possible that these transversely marked implements may have been used in Games, not being without resemblance to some of the gambling-instruments of the Indians of North-west America, as we are informed by Dr. Robert Brown. We learn, moreover, from Milton and Cheadle's 'North-west Passage by Land,' 4th edit. 8vo, 1865, p. 150, that these Indians also notch sticks as they win and lose the stakes in their nearly interminable games of chance. Indeed Dr. Brown says that the Indians always keep count, in this way, of the number of days they travel with you, and so on.

3. The closely notched tally-like fragment, from Cro-Magnon, in B. Plate XII. fig. 10, has already been described (page 96); and the notched bone implement, fig. 4, B. Plate XXIV., with its snake-like ornament, has a similar character.

4. B. Plate II. fig. 8 *b* shows three series of parallel incised lines, at right angles to three imperfect transverse lines, one of which is forked at one end; and there are some chevron marks touching these latter lines. They all seem to have been cut subsequently to the Eel (?) in the carving; and their meaning, if they had any, remains enigmatical. Possibly they were meant as a symbol for *water*. Their ogham-like arrangement (that is, the parallelism of some, perpendicular to an axial line) is noticeable, though it may really be accidental.

§ V. *As to the Pitting.*—With regard to the *pitting* on fig. 13, B. Plate XIII., whether it be ornamental or inscriptive, we need not refer to many specimens as analogous, although punctate markings and circular indentations are not at all uncommon as savage decoration.

1. As the first instance, we may allude to the ornament of an Australian Boomerang (from Victoria), now in the Christy Collection, which is covered on one side (the convex face) with irregular transverse rows of rough pits, filled with white pigment. These are necessarily much larger than those on fig. 13, as the numbers in the rows are about the same on the two specimens, but the Boomerang is very much the broader of the two.

2. For a second example we may refer to another specimen in the Christy Collection, namely an African armlet with an ivory pendant ornamented with rows of dots, or pittings filled in with dark-coloured pigment.

3. For a third case we refer to a broken subcylindrical Dart-head, from La Madelaine, now in the University Museum, Oxford (fig. 7, B. Plate XXV.), which bears on one edge, high up towards the point (lost by an old fracture), a series of about forty small pits. These may be looked on as forming three longitudinal rows, with an irregular alternation, and with some confusion at the lower end,

where the left-hand row of thirteen pits (fig. 7*b*) curves across the end of the middle row; and another group (of four in one line, and two in other) intrudes between the left-hand row and the edge: the pits of the middle row are more closely set than the others; and this row has certainly been interrupted by the fracture of the implement; and so probably has the right-hand row also. Again, the pitting may be regarded as having been arranged in irregular transverse rows of threes and twos, with occasional single pits. On the surface, however, of the bone longitudinal interrupted lines appear to have been drawn to indicate the lineal position of some at least of the pits (see fig. 7*c*, and the Description of B. Plate XXV.).

How far the position of these serial pits on the Dart-head, in one patch only, may influence our readers in regarding them as inscriptive (the Owner's Mark, or his Hunting-score) we cannot say; and whether we ought to regard them as the aimless tooling of an idle time, as holes for the lodgment of poison, or as the intentional ornament or unfinished decoration of the weapon, which the maker or owner thought to spot all over, just as some such stems are scored all over*, we do not pretend to decide until further evidence offers itself.

4. We may also draw the reader's attention to the systematic pitting on the subpentagonal Game-stone, figured and described in the 'Catalogue of the Antiquities in the Museum of the Royal Irish Academy,' 1857, p. 125, fig. 99.

Conclusion.—Having thus described and commented on the peculiar knife-like ivory plate, from the Gorge d'Enfer, marked with regular pits, marginal notches, and groups of lateral scorings, and having taken into consideration numerous ancient and modern implements, mostly of savage make, which show, one or the other, similar shape, systematic pittings, crenulated edge, and scorings, either simple or compound, and known in some instances to be Tally-marks, in others Owner-marks, and in some to be indicative of Gambling, we may be assured that some at least of the Cave Implements served for like purposes in ancient times.

Poison-grooves, capricious and useless cutting and dotting, and unfinished carving may probably enough account for some of the specimens referred to, and many analogous examples. The number and great variety, however, of the systematic markings lead to the conclusion that in the majority of cases they were not the result of accident or chance, but of intentional workmanship, the uses of which certainly furnish food for conjecture, and must indicate the habits and propensities of the long-past Cave-folk.

* See for instance fig. 4, B. Plate III. & IV., and fig. 11, B. Plate XXIII.

XVIII.

FLINT—ITS NATURE, CHARACTER, AND ADAPTABILITY FOR IMPLEMENTS.

By Professor T. Rupert Jones, F.R.S., F.G.S.

[These notes on Flint were written at the late Mr. Henry Christy's request in 1864 or 1865, and set up in type by his desire soon after.]

Flint, the well-known hard stone out of which so many old Implements have been fashioned, is more or less abundant in nearly all Chalk districts. It is, indeed, found in one condition or another (flint, hornstone, chert, chalcedony, &c.) in most limestones, whether soft and earthy (like Chalk), solid (like the Portland stone), or hard and crystalline (like the Mountain-limestone of Derbyshire and other calcareous rocks of even older formations).

Flint occurs both as extensive sheets and as lumps or nodules, generally in regular beds, and sometimes as veins crossing the bedding. It is fine-grained or homogeneous—consisting of silica, such as is also seen in the form of rock-crystal (quartz), but not so pure, containing some iron, clay, lime, or other impurities, besides having rather more water in its composition.

It is often found as gravel and shingle; and in that state it is the flinty ruins of Chalk or other limestones that have been broken down and worn away by frost, torrents, and sea-waves.

In the Chalk, flint usually presents itself in irregular lumps, blackish within and white without, breaking up (by frost or under blows) with a clean fracture and sharp translucent edges. It sometimes shows evidence of the presence of a Sponge, or some sponge-like organism, inside it; and other fossil bodies are often seen in it. This silica, indeed, was once in solution in the water, and, either separating from the calcareous mud that subsequently became Chalk or permeating it, has been accumulated in and about the Sponges, not only changing them, but some of the surrounding Chalk, into its own substance; for frequently a layer of greater or less extent of the calcareous material, before or after its hardening, has been converted atom for atom into flint, excepting the shells of Mollusks of the Oyster group, and the tests and ossicles of different kinds of Echinoderms (Sea-urchin, Starfish, and Stone Lily). In the Portland stone, the oolitic structure is preserved in the transmuted flint bands; so also the organic structure of small fossils in some of the flint of the Polyzoan limestone of Central France; whilst in

some West-Indian limestones the little Orbitoides and Nummulinæ, and their imbedding matrix, are silicified in varying degrees at different places*.

However found, the nodules and bands of flint have yielded fit material for human hands to fashion into sharp-edged tools and weapons, whether the blocks were taken from the Chalk itself or other limestone, or from the rolled pebbles and gravel strewed over countries where the Chalk has suffered degradation.

The action of frost on a flint might result in the production of two or more pieces, more or less triangular, with points and edges, and capable of being used as rough cutting-instruments, or, being set with others like them side by side along a stick, formed into a cutting-stick or armed club.

Blows, also, and even pressure on a flint, if properly directed, produce angular flakes, with sharp edges, owing to the mode of fracture that this mineral possesses, somewhat after the manner of glass and resin, though it is less brittle than either.

Given a solid block of flint, flakes may be struck off its sides†, and other flakes, parallel to the first fractures, off the remaining surface, until the flint is reduced to a small centre-piece bearing several narrow facets. Such a flaked piece is a "core," from which one or more sets of flakes have been removed (A. Plate I.); such a "core" or "nucleus" will be somewhat prismatic, and must be the result of well-directed blows, striking off flakes or narrow laminæ, having their *axes* in one direction; the blows, succeeding each other round the edge of the prism, produce a succession of new narrow faces, bounded by parallel ridges or long solid edges; and these being carried away with the new set of flakes, each flake will have one or two angles along its outside, or back, and a nearly even narrow face within (A. Plate II.). At the end of the flake where it was struck there will be more or less of a convex swelling, called the "bulb of percussion," due to the "conchoidal" style of fracture which the flint shows when smartly hit; and the further end of the flake will usually taper somewhat and have a curve, the hollow of which fits against the "core." Obsidian‡ behaves in the same way under well-directed blows or pressure, and, though more homogeneous, yields scarcely larger, cleaner or neater flakes, razor-shaped and thin-edged, than flint will if carefully selected and judiciously handled.

* Geological Magazine, vol. i. 1864, p. 102.

† See Dr. Falconer's remarks on this subject in his paper on the Maccagnone Cave, Quart. Journ. Geol. Soc., vol. xvi. p. 105. At the reading of this Memoir, June 22, 1859, Dr. Falconer fully illustrated the process of "dislamination, as films, of the long angles of prismatic blocks of stone." The agate form of chalcedony, also jasper, lydite, quartzite, and solid vein-quartz behave under blows and pressure similarly to flint and its varieties above mentioned.

‡ See Mr. E. B. Tylor's 'Anahuac,' 1861, pages 95–99 and 331.

Both neat and rough flakes, however, tell their own history, as design must be concerned in their formation; and hundreds may have often been struck off "cores" of flint in some stations (or places where the old Flint-folk lived, or at least manufactured their implements) and allowed to lie about, whilst but few, perhaps, were selected as being of the right shape for the purpose intended, whether used in their original shape or further trimmed by flakings and chippings of edges or ends.

Again, pebbles of flint and large flake-like pieces may be, and have been, "dressed" into definite shapes—as hammers, tomahawks, axes, wedges, chisels, knives, scrapers, and heads of spears, lances, javelins, harpoons, and arrows—by careful removal of flakes and chips by repeated and well-directed blows of varying force, chiefly along the intended edges of the instrument. The peculiar fracture of flint (flaky, but showing everywhere a tendency to the "conchoidal" condition, with concavo-convex surfaces) allows of this procedure, and indeed has led to its being done, as is the case with obsidian also. The reiterated blows in definite directions, removing flakes more or less parallel, and resulting in a nearly symmetrical, more or less convex surface, are as plainly traceable as if they had been given under our own eyes; and the resulting surfaces are very different, when carefully examined, from what occurs on any much-broken or many-faced flint on the beach or in a gravel heap.

The strong curvatures on flakes of flint and obsidian broken off by smart blows, culminate in what is termed the "bulb of percussion," and, with the corresponding conchoidal hollows on the "cores," are of rare occurrence in the naturally broken stones; and hence they are good tokens of human workmanship*.

A further development of the conchoidal fracture is seen in the cones produced by direct blows on some solid flints. Circular and semicircular concentric flaking is produced by such blows; these overlapping flakes flying off, a solid cone remains. The battering of shingle on the beach produces such minute concentric flakings by the innumerable blows of pebble on pebble; and, by the easy removal of the thin edges of the little circular flakes coating the minute cones, the rolling wears the pebbles round.

Broken flint, exposed to the weather, to water, or to moisture under ground, suffers certain changes of surface. If dark-coloured, it loses its uniform tint and translucency, becoming opaque and either blotched or wholly white or yellow; if

* One of the newly invented stone-breaking machines *chips* small fragments from the rough blocks by direct blows, without crushing; hence road-metal prepared by such a machine consists largely of *flake-chips* having bulbs of percussion.—Edit. Rel. Aq. 1873.

originally yellowish, it retains its colour more persistently. The dulness, also, of a fresh fracture is changed for a more shiny surface, and under some circumstances, such as when alkaline water has affected the flint, the surface becomes quite smooth and shining, showing the "patina" that may be recognized, for instance, on the old flint implements from the gravel.

The discoloration and "patina," as well as the "dendritic" markings of metallic oxides creeping over parts of the surface, and incrustations of oxide of iron and of carbonate of lime by permeating waters, cannot be taken as independent evidences of very great age for worked flints, since these superficial changes and appearances can be produced within limited periods of time; nevertheless it is necessary to notice them as the result of some lapse of time, and of certain conditions of deposit, as well as indications sometimes not only of the differences of faces produced artificially from natural surfaces of the flint, but of the successive production of artificial and accidental fractures in worked flints.

P.S.—The very many Memoirs and Books in which Flint Implements and the methods of their manufacture have been treated of since 1860 constitute a literature of itself*.

Besides the standard works on the subject by Nilsson ('On the Stone-Age' &c. 1843–67), Stevens ('Flint Chips' &c. 1870), Evans ('Ancient Stone Implements' &c. 1872), and the many papers and notices referred to by them, we must especially direct attention to Mr. S. J. Mackie's remarks on the manufacture of flint tools, in the 'Geologist,' 1861, vol. iv. pp. 26–29, and to Professor T. McKenny Hughes's paper on the same subject (Proc. Soc. Antiq. Lond. 2nd ser. vol. iv. p. 94), part of which was afterwards published *in extenso* in the 'Geological and Nat.-Hist. Repertory' &c., May 1, 1868, vol. ii. No. 34, pp. 126 &c., Mr. Mackie's further account of "the natural fractures of flints," in vol. iii. pp. 205 &c., and Mr. T. Baines's interesting and illustrated letter on the Australian flake-makers, *ibid.* pp. 258–262. See also Professor T. McK. Hughes's note on the fracture of chert and flint in the 'Report Brit. Assoc.' for 1872, Trans. Sect. p. 189; and the late Mr. Henry Christy's remarks on the subject, 'Transact. Ethnolog. Society,' New Series, vol. iii. 1865, pp. 362 &c., and 'Reliquiæ Aquitanicæ,' Parts II. and III., 1866, pp. 13–20.

T. R. J.

September 1873.

* Many references will be found in Mortillet, Trutat, and Cartailhac's 'Matériaux pour l'histoire de l'Homme,' 1864–73.

XIX.

ON A PIECE OF ELEPHANT'S TUSK ENGRAVED WITH THE OUTLINE OF A MAMMOTH, FROM LA MADELAINE, DEP. DORDOGNE. By the late M. E. Lartet.

[From the 'Comptes Rendus des Séances de l'Académie des Sciences,' vol. lxi. (Séance du 21 Août, 1865), pp. 309–311.]

(See B. Plate XXVIII.)

On August 21, 1865, M. Milne-Edwards communicated to the Academy the following letter by M. Lartet—relative to a slab of fossil ivory, found in an ossiferous deposit in Périgord, and marked with incisions apparently representing a long-haired Elephant.

"Since you think good to give publicity to the palæontological specimen which was shown you, and on which some have found the contours and other linear details of an animal form referable to an Elephant, I will hand over to you, before leaving, a cast of that fragment, prepared by M. Stahl, the able artist attached to the Museum of Natural History; and the original, after my return to Paris, will be at the disposal of those who desire to make a more direct examination. The history of the specimen, found more than fifteen months ago, is this:—

"In May 1864 M. de Verneuil and our deceased friend Dr. Falconer having shown a desire to visit the caverns and other localities of the Dordogne which I had explored in company with my much regretted fellow-labourer the late Mr. H. Christy, I accompanied them in that excursion. We were at that time still excavating at the Madelaine, which had already furnished a number of those animal figures carved on bone or on reindeer-antler, which were submitted last year to the inspection of the Academy.

"On our arrival the workmen had just discovered five broken pieces of a rather thin plate or slab of ivory, once forming part of a moderate-sized tusk of an Elephant. Having joined the pieces together, according to lines of junction marked out by the minute intricacies of fracture, I showed Dr. Falconer the numerous characteristic, though shallow, engraved lines, which seemed to me to indicate some animal forms. The practised eye of the celebrated palæontologist, who has so well studied the Proboscidians, at once recognized the head of an Elephant; and he soon pointed out other parts of the body, and particularly, in the region of the neck, a bundle of descending lines, which recall the long shaggy

hair characteristic of the Mammoth, or Elephant of the Glacial Period *. We know that this specific peculiarity, indicative of the subarctic habitat of an animal of this genus, had been verified, in 1799, by Mr. Adams, of the Academy of Saint-Petersburg, by the remains of a carcass of the same kind of Elephant (*Elephas primigenius*) imbedded, flesh and bone, in the ice near the mouth of the Lena. In the Geological Gallery of the Museum a tuft of the long hair of this Mammoth can be seen †.

"Not wishing, in accordance with the rule we had laid down, to publish this discovery previously to confirmation by analogous observations ‡, I merely showed the specimens to some persons of competent judgment. I may mention, among others, Messrs. de Quatrefages, Desnoyers, and de Longpérier, who, together with yourself, have examined it with the most scrupulous attention; also Mr. A. W. Franks, Director of the Society of Antiquaries of London, who has taken the trouble to examine the cast, and to blacken with pencil the more definite lines of carving, and the more characteristic forms which he can distinguish by means of them. It is therefore, in reality, the opinion of these eminent scientific men, including Dr. Falconer and yourself, that is produced before the Academy, rather than my own.

"This new fact will not, indeed, add any thing to already acquired convictions as to the coexistence of Man with the fossil Elephant (*Elephas primigenius*) and other great Herbivores and Carnivores which geologists regard as having lived together in the earlier phases of the Quaternary Period. This truth of retro-

* "On the cast there is, in the lines descending from the summit of the head, a gap corresponding to a transverse crack filled up by cement in the original."

† [Portions of the hide, with its coat of black bristly hair, 15 inches long, shorter hair of a fawn colour, and reddish-brown wool, are preserved also in the Natural-History Museum at St. Petersburg, and in the British and Hunterian Museums, London.—Edit. Rel. Aq.]

‡ [Another indication of the Aborigines of Périgord being acquainted with the Elephant or Mammoth is shown by the carved head of an Elephant, which was once the butt-end of an ornamented Antler ("Bâton de commandement" or "Pogamagan"), from Laugerie Basse (Dordogne), in the collection of the Marquis de Vibraye. See 'Matériaux pour l'Histoire de l'Homme,' vol. iii. p. 206; vol. iv. p. 465.

A far less definite indication is an obscure outline of what M. Elie Massenat regards as the head and trunk of an Elephant, cut on a piece of smooth bone from the same Station. 'Matériaux' &c. vol. v. p. 354, pl. 22. fig. 2.

That the neighbouring people, probably of the same race, who left their remains at Bruniquel (Tarn-et-Garonne), personally knew the Elephant, is proved by the figure of that animal carved out of the palm of a Reindeer Antler as the handle of a poniard, found at Bruniquel, and in the Collection of M. Peccadeau de l'Isle. See 'Revue Archéologique' for March 1868; and 'Matériaux' &c. vol. iii. p. 206, and vol. iv. p. 97, fig. 32.—Edit. Rel. Aq.]

spective evidence is deduced now-a-days from so great a number of concordant observations, and of material facts of so clear a significance, that minds the least prepared to admit it are not slow to accept it in all its reality, when they will but take the trouble to look and then judge conscientiously.

"Permit me to take this occasion of requesting you to point out to the Academy two discoveries of even more immediate interest in regard to my studies on the geographical distribution of the Quaternary Mammalia. In the first place, the discovery of the remains of a Marmot, of a new species, or at least different from that of the Alps, in a cavern of the Dordogne, anciently inhabited by Man. The second fact, still more important, is the occurrence, also in Périgord, at another Human Station of very great antiquity, of a number of bones of *Ovibos moschatus* or Musk-ox, showing a state of fracture analogous to that of other animal bones used for food by the aborigines. These bones of the Musk-ox were found associated with the remains of the great Bears, the great Cave-cat (*Felis spelæa*), the Reindeer, Aurochs, Horse, &c., and in the midst of relics of human industry, thus testifying to the persistence of a glacial climate at the time when Man was already established in this region of Europe, now so temperate in climate. We know, indeed, that the Musk-ox, at present exiled to Arctic North America, never comes on this side of 60°; in the early part of the Quaternary Period, therefore, he came 15° of latitude further to the south in this district. It is deserving of remark that M. Alphonse Milne-Edwards* has arrived at analogous conclusions by his study of the fossil Birds from our caverns and other Human Stations of Périgord."

* Société Philomathique, Séance du 8 Juillet, in the 'Institut' for August 3, 1865.

XX.

ON AN ENGRAVED FIGURE OF A GLUTTON FROM ONE OF THE DORDOGNE CAVES.

By Professor T. Rupert Jones, F.R.S., F.G.S.

The accompanying woodcut is engraved from the photograph of a specimen believed by the late M. E. Lartet to have been abstracted by a workman from one of Mr. H. Christy's diggings in the Caves of Dordogne.

Fig. 80.

Outline of the Glutton, cut on a piece of Antler, from one of the Caves in the Department of the Dordogne.

In M. G. de Mortillet's "Promenades préhistoriques à l'Exposition universelle," 1867 ('Matériaux pour l'histoire de l'Homme,' vol. iii. p. 201), this specimen, referred to as being exhibited among others from the Caves of the Department of the Dordogne, and belonging to M. Peccadeau de l'Isle, is described in these words:—"La pièce capitale est une lame de bois du renne, trouée pour suspension, portant une gravure très-nette d'un animal qui a un peu le museau carré des hippopotames, mais qu'il est fort difficile de déterminer exactement."

The object itself is a blade-like piece of Reindeer antler, perforated near one end, and bearing an incised outline of a hairy quadruped, with heavy head and large tail. To this figure the Glutton, *Gulo luscus* (Linn.), most nearly answers, as indeed the late M. Lartet always thought. The hairy saddle on the back of the figure very nearly coincides with the outline of the "blackish dorsal disk" (Dr. J. E. Gray, "On the Mustelidæ," 'Proceed. Zoolog. Soc.' 1865, p. 120), well seen in Schreber's figure of the Glutton ('Säugthiere in Abbildungen nach der Natur mit Beschreibungen,' iii. 1778, p. 525, pl. 144), and in that given by Pallas ('Spicilegia Zoologica,' xiv. 1779, pl. 2); and distinguishable in the more lively picture of the Glutton in Paul Gervais's 'Histoire naturelle des Mammifères,' 1855, p. 109. The tail and jaws in the outline from the Dordogne are larger than represented by either Schreber or Pallas, who seem to have had their drawings

made from dry stuffed specimens. Gervais is more true to nature in giving a fuller tail and a rather thicker, though short, muzzle; but the last is not so large as that in our engraving (fig. 80), which may be an exaggerated feature, and due to the imperfect art, or obstinate whim, of the aboriginal draughtsman.

The exact proportions, however, of the North-European Glutton are best shown in the annexed Woodcut (fig. 81), being a portrait of the Glutton now living in

Fig. 81.

The Glutton (*Gulo luscus*) in the Zoological Society's Gardens, London. Drawn by N. L. Austen, Esq., F.L.S., F.Z.S., &c. About one sixth of the natural size.

the Zoological Society's Gardens, London, carefully studied and drawn by Mr. N. Laurence Austen, F.L.S., F.Z.S., who is well acquainted with the Glutton in its Norwegian home.

The Asiatico-European Glutton (*Mustela gulo*, Linn., *Gulo arcticus*, Desm.) has been specially treated of by Pallas in his 'Zoographia Rossico-Asiatica,' 1831, vol. i. pp. 73–75, and by many classificatory naturalists. See C. Knight's 'Penny Cyclopædia,' 1838, article Gulo.

The North-American Glutton, or Wolverene, *Gulo luscus* (*Ursus*, Linn.), first figured by Edwards in his 'Natural History of Birds,' in 1747, p. 103, pl. 103, is described in Dr. Richardson's 'Fauna Boreali-Americana,' 1829, p. 41, and in Baird's 'Mammals' &c. 1857, p. 181, and has been treated of by very many travellers and writers. See 'Penny Cyclop.' *loc. cit.* The two forms are now regarded as belonging to one species, *Gulo luscus* (Linn.). Dr. Robert Brown,

in his paper "On the Mammalian Fauna of Greenland," 'Proceed. Zoolog. Soc.' 1868, pp. 358 &c., gives some interesting notes about the probable non-occurrence of this animal in Greenland.

The following note on the Glutton, taken from 'The Geographical Distribution of Mammals,' by Andrew Murray, 1866, p. 116, is quite applicable in this place:—

"Gulo. The Glutton, or Wolverene, is generally believed to be found in all the three continents of Europe, Asia, and America, although there are still some authors who are disinclined to admit the identity of the old-world and the new-world species. It is a boreal, almost an arctic, animal, coming in the category of those which compose the circumpolar zone of life; and yet its remains have been found in the Caves of Gailenreuth [Franconia], Liége, and Voidon near Joyeuse (Ardèche), and in the caverns of Germany. These remains have been supposed to belong to an extinct species (*G. spelæus*); but both Baron Cuvier and De Blainville were of opinion that they were those of the existing species. Another extinct species has been described by Kaup from Eppelsheim, under the name of *G. antediluvianus*; but it may belong to the living species. If they belonged to the present species, we cannot escape from the inference, that either it has changed its nature so far as to require now a colder climate than it did formerly, or else that the climate of Europe was much colder when the individuals whose bones are found in the caves in question roamed through France and Germany than it is now."

In May 1871 Mr. W. Boyd Dawkins, F.R.S., F.G.S., communicated to the Geological Society of London a memoir on the discovery of the Glutton in Britain, (1) at the Plas-Heaton cave, on the Elwy (near Cefn, St. Asaph), North Wales, by Messrs. Hughes and Heaton, and (2) from the caves of Banwell and Bleadon (Somerset) and Gower (South Wales), by Messrs. Sanford and Dawkins; and the following extract of observations, resulting from his special examination of the British remains of the Glutton, are well worthy of note, and will be fully appreciated by all interested in the study of the Cave-fauna of Western Europe, and in the inquiry as to the coexistence of the Glutton with the Cave-folk of Périgord.

"The Glutton of the present day inhabits the inclement northern regions of the Old World, to the point where the forests gradually die down into the lonely wastes of the 'Tundras,' and is to be found in Norway, Sweden, Lapland, and as far east as Kamtschatka. In the New World it ranges, under the name of 'Wolverine,' northwards from the latitude of Canada. It was seen by Ross in the 70° parallel in the winter; and its bones have been met with in Melville Island. Its southern limit in Asia is the latitude 50°, where it occurs in the Altai. In Europe its southern limit is not clearly defined; but it has steadily retreated northwards as the vast forests of Germany and Poland gradually fell under the axe of the woodman. According to Eichwald, it once lived in the Lithuanian region with the Bison, which still lingers there under the protection of an Imperial ukase; and Zimmermann adduces proof of its having been killed as far south as Helmstadt, in Brunswick*.

"In the Pleistocene Caves of Germany it is found abundantly, with the Reindeer, Cave Lion, and Hyæna,

* "The authorities consulted for the range of the Glutton are Blasius (Fauna der Wirbelthiere Deutschlands), Zimmermann (Specimen Zoologiæ Geographicæ), and Sir John Richardson (Fauna Boreali-Americana)."

at least as far south as Gailenreuth, in Bavaria, where it was first discovered by Dr. Goldfuss. It is figured and described from the Caves of Belgium by Dr. Schmerling. We might therefore naturally expect to find the animal ranging over our Island at a time when it formed part of the mainland of Europe, and offered free access to the same animals (the Reindeer, the Lemming, and the Horse) as those which still furnish food to the living Glutton in Siberia. The presence in Great Britain of a creature adapted for enduring the severity of an Arctic winter, and not now found in any hot regions, with the Reindeer, Lemming, and Musk-sheep, implies that the Pleistocene winters were of an Arctic severity,—just as the Hippopotamus, found under precisely the same conditions, and associated with the same group of animals, points to a hot summer like that which obtains on the Lower Volga. The intimate association in one spot of animals now confined respectively to the hottest and coldest regions seems to me admit of no other explanation."—*Quart. Journ. Geol. Soc. London*, vol. xxvii. p. 409.

XXI.

NOTES ON THE SCANDINAVIAN REINDEER. By N. Laurence Austen, Esq., F.L.S., F.Z.S., &c.

Wild Reindeer were formerly, it is believed, found throughout the greater portion of the Scandinavian peninsula; but at the present day they are confined to

[*To face* page 212.

NOTE.

Subsequently to the printing of Sheet "2 F" (pp. 205–212) appeared Dr. Louis Lartet's short memoir, "Gravures inédites de l'âge du renne, paraissant représenter le Mammouth et le Glouton," in the 'Matériaux pour l'histoire de l'Homme,' 2e sér., vol. v. pp. 33–36, with woodcuts of (1) two lively heads of the Mammoth, in outline, on a plate of bone from Périgord (figs. 20 & 21), and (2) of the Glutton (fig. 22), which we have also figured, from a Photograph, at p. 209, fig. 80.

reached the moss, they are frequently driven away by the hinds and younger males, which, retaining their antlers during the period of winter, are thus enabled to keep off their more vigorous companions.

at least as far south as Gailenreuth, in Bavaria, where it was first discovered by Dr. Goldfuss. It is figured and described from the Caves of Belgium by Dr. Schmerling. We might therefore naturally expect to find the animal ranging over our Island at a time when it formed part of the mainland of Europe, and offered free access to the same animals (the Reindeer, the Lemming, and the Horse) as those which still furnish food to the living Glutton in Siberia. The presence in Great Britain of a creature adapted for enduring the severity of an Arctic winter, and not now found in any hot regions, with the Reindeer, Lemming, and Musk-sheep, implies that the Pleistocene winters were of an Arctic severity,—just as the Hippopotamus, found under precisely the same conditions, and associated with the same group of animals, points to a hot summer like that which obtains on the Lower Volga. The intimate association in one spot of animals now confined respectively to the hottest and coldest regions seems to me admit of no other explanation."—*Quart. Journ. Geol. Soc. London*, vol. xxvii. p. 409.

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Wild Reindeer were formerly, it is believed, found throughout the greater portion of the Scandinavian peninsula; but at the present day they are confined to the more northern parts. They exist in large herds on the more elevated mountain plateaux of Norway—but do not appear to descend lower than the Birch-limit, about 3700 feet above the sea-level, and seem never to frequent the dense Pine-forests which clothe the lower slopes of the mountains.

The principal food of the Reindeer during the summer months consists of grass and the foliage of the dwarf Willows (*Salix glauca* and *S. hastata*). They also feed on various species of *Cerastium*, on the Buckbean (*Menyanthes trifoliata*), and they are especially fond of the Glacier Buttercup (*Ranunculus glacialis*), which is found only above the Birch-limit, and extends considerably above the line of perpetual snow, growing in clefts of slaty rock. This plant is called "Renblumme," or Reindeer-flower, in Norsk; two varieties of it are known, one having white, and the other purplish blossoms.

During the winter the Deer subsist almost entirely on the Reindeer-moss (*Cladonia rangiferina*), which grows on the higher parts of the "fjeld." There is a prevailing idea that the Reindeer uses its broad frontal antlers to plough up the snow when searching for the moss; but this, I believe, is not the case, as the full-grown stags, whose horns alone possess this peculiarity of form, shed their antlers in the earlier portion of the winter, about the middle of November, the hinds and immature males retaining theirs until the ensuing spring. An experienced Norwegian hunter, who was with me for several seasons in the mountains, assured me that in severe weather the Deer united in large herds, and resorted to the highest parts of the fjeld, where the snow does not lie so deeply, constant gusts of wind sweeping over it and causing it to collect in ravines and sheltered corries. In such situations, where the snow is thinnest, the largest and most powerful stags go in advance of the herd, and scrape up the snow with their fore feet; but having reached the moss, they are frequently driven away by the hinds and younger males, which, retaining their antlers during the period of winter, are thus enabled to keep off their more vigorous companions.

At the commencement of spring the Reindeer descend from the snowy regions to the subalpine pastures, for the purpose of feeding on the sweet young grass then springing up; but as soon as the weather becomes warm, they return to the highest fjelds to escape the plague of insects, as they are especially annoyed at this season by a species of Breeze-fly (*Œstrus tarandi*), which lays its eggs, covered with an adhesive secretion, on the hairs of the Deer's back. The larvæ, when hatched, burrow their way beneath the skin, and, as in the case of the *Œstrus bovis*, which attacks cattle, form a considerable swelling.

During the heat of summer, the herds resort to the largest "Snee-fonds," or snow-fields, remaining on the snow during the day and descending morning and evening to feed. At this season the old stags separate from the main herd, not rejoining it until their horns are fully developed, which takes place about the beginning of September, when the animals are in their best condition.

The period of gestation with the female is about eight months; the fawns are generally produced in May or the beginning of June. In August the fawns have horns from 4 to 9 inches in length, according to sex; and in November, when they lose the velvet, the antlers measure from 12 to 15 inches.

Unlike the generality of the deer tribe, the young are not spotted or dappled when first born, but are of a uniform reddish-brown tint. In August this changes to a blackish colour, becoming grey during the winter. In the adult Deer the winter coat is extremely thick, varying in hue from dark brownish red to nearly white. The stags at this season have a mane, or ruff, of white hair on the neck and throat, which in some specimens attains a great length.

The hoofs of the Reindeer are large and broad, being admirably adapted to support the animal in its passage over soft snow or among slippery rocks. A peculiar clicking noise is heard when the animal is in motion, occasioned by the contraction of the hoof when the foot is raised from the ground, and the consequent striking of the two portions of the hoof against each other. In descending precipitous slopes of rock, they obtain increased security of foothold by the use of the spurious hoofs, which, as in the case of the Chamois and other mountain-animals, are capable of considerable holding-power. The hind legs are much longer in proportion to the others than is usually the case among the deer tribe; and this peculiarity of structure is of great assistance to the animal in traversing rocky ground.

Although both sexes are furnished with horns, those of the hind (or "simle," as she is called in Norsk) rarely exceed 14 to 18 inches, measured along the curve; while those of the stag, or "ren," reach a much larger size. A pair

Fig. 82.

A Pair of fully developed Antlers of a Siberian Reindeer, in the Hunterian Museum of the Royal College of Surgeons*.

* [This is described in the 'Descriptive Catalogue of the Osteological Series contained in the Museum of the

in my possession, taken from a Deer shot by myself two years ago, measure as follows:—

	inches.
Length of antler, following curve	47
Width between antlers, from tip to tip	41
Length of brow-antlers	14–15

The total number of points, including the small ones on the brow-antlers, is thirty-seven; but the head is a remarkable one, and by far the finest I have ever shot. I have described the circumstances under which this head was obtained in an article which appeared in 'Land and Water' of February the 4th, 1871.

In the great majority of Reindeer horns from Northern Europe only one brow-antler is fully developed—the other appearing in a rudimentary form, as a knob, or in some cases as a spike, 3 or 4 inches in length.

I have noticed that this is also the case with the North-American "Caribou," though I have seen heads of this animal from Newfoundland in which both frontal antlers are perfectly developed *.

The European Reindeer seems to be more exclusively a mountain-animal than its American congener, which appears to inhabit densely wooded districts, as well as extensive "pine-barrens" and open plains.

The variety of Reindeer found in Spitzbergen † is considerably less in size than the Norwegian animal. I have examined several heads reported to be Greenland and Spitzbergen specimens, which, though evidently taken from adult males, had

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Royal College of Surgeons of England,' vol. ii. "Mammalia Placentalia" (4to, London, 1853), as "No. 3519," in which "both brow-snags are equally developed with compressed branched palms," p. 585; and it is here figured (by permission) not only to illustrate the size and form of the full-grown antler, but to show the relative position of the great palmate brow-antlers, such as have been used for the etchings of bovine and other animals figured in B. Plate II. fig. 6, B. Plate XIX. & XX. figs. 2, 3, and 4. See also the figure engraved on stone, A. Plate XXX. fig. 5.

Besides a large collection of Reindeer horns, exemplifying remarkable variations of shape and size, a very large head and antlers of a Caribou from Newfoundland is to be seen in the Hunterian Museum, and is described in 'Descriptive Catalogue' above-quoted, p. 587, as "No. 3534," in which "the right brow-snag is much expanded vertically, and palmate; the left one is bifurcate, the prongs being long, round, and simple. The front branch of the beam and the termination of the beam are palmate."

The reader is referred also to the Description of the series of young and old Antlers, figured in C. Plate VII. & VIII. pages 169, 170.—Edit. Rel. Aq.]

* In 'Forest Life in Acadie, with Sketches of Sport in Newfoundland,' 8vo, 1869, by Capt. Hardy, R.A., a plate is devoted to the difference of form between Caribou heads from Nova Scotia and from Newfoundland.

† Some remarks on the Reindeer of Spitzbergen are to be found in Mr. James Lamont's 'Seasons with the Sea-horses,' 8vo, 1861, chap. xv.

the number of points at the top of the horns very irregular; in some instances there were several points on the summit of one horn, and only the single beam on the other.

The rutting-season of the Norwegian Reindeer begins early in October; and the more powerful stags then leave their solitary haunts and rejoin the large herds. At this period the males utter a peculiar, hoarse, guttural roar, which can be heard at a considerable distance, and, when listened to among the mountains at night, would not be supposed to proceed from a Ruminant.

The stags at this period become very pugnacious, and desperate battles take place between them, in which their horns become sometimes locked together in the same way as those on the two Elk skulls in the Hunterian Museum at the Royal College of Surgeons, so that the animals are unable to extricate themselves.

In former times great numbers of wild Reindeer were captured in Norway by means of pitfalls, usually constructed in some narrow rocky pass which the Deer would be obliged to traverse in single file. I have seen many remains of these contrivances, called "Rengraven;" but, as the present game-laws of Norway forbid their use, they have been filled up. They were oblong in shape, about 6 to 8 feet in length by 2½ in breadth, the sides of the pit being built in with flat stones, and 5 or 6 feet in depth. These were covered with small sticks and brushwood, over which a thick layer of moss was laid. Of course, when the Deer trod on the concealed trap, it was instantly engulfed; and its struggles to escape were useless, from the depth and narrowness of the pit.

An ingenious and somewhat similar method of capturing the American "Caribou" is practised by the Esquimaux inhabiting the country to the southward of Chesterfield's Inlet. The sides of this trap, according to Dr. Richardson, are built of slabs of snow, cut as if for a snow house. An inclined plane of snow leads to the entrance of the pit, which is about 5 feet deep, and of sufficient dimensions to contain two or three full-grown Deer. The pit is covered with a large thin slab of snow, which the animal is enticed to tread upon by a quantity of the lichens on which it feeds being placed conspicuously on an eminence beyond the opening. The exterior of the trap is banked up with snow, so as to resemble a natural hillock, and care is taken to render it so steep on all sides but one, that the Deer must pass over the mouth of the trap before it can reach the bait. The slab is sufficiently strong to bear the weight of a Deer until it has passed the middle, when it revolves on two short axles of wood, precipitates the Deer into the trap, and returns to its place again, in consequence of the lower end being heavier than the other.

In some parts of Lapland and Russian Finland, another device, called the "Vild Ren Hage," is adopted for capturing Reindeer. A kind of fence about two miles long is constructed of small trees matted and interlaced with brushwood. Openings are left at intervals, about 3 feet in width, and two stout posts are driven into the ground on each side; to one of these is attached a strong noose made of thick rope, which is retained in a circular form by means of very slender twigs which give way at the slightest touch; and, to prevent the fawns from leaping through without entangling themselves, two threads are placed diagonally across it.

It is said that when the Deer meet with these hedges, which are usually made at the time of their partial migration to the lower grounds in spring, they proceed along them, until they come to one of these openings, in forcing their way through which, one of their number is usually entangled in the snare.

Fig. 83.

Cervus tarandus, *Linné.*

G. R. DeWilde del. et sculpsit.

Note.—We deeply regret the recent death of the talented young naturalist and traveller, Mr. Nathaniel Laurence Austen, F.L.S., F.Z.S., who favoured us with this note on the Reindeer, and with the sketch of the Glutton given at page 210. He died, on August 9th, from concussion of the brain, caused by a fall from his horse; and his sorrowing friends see the promise of a useful life of observation and research sadly cut off by his sudden death.—Editor Reliq. Aquit.

XXII.

ON FISHING DURING THE REINDEER-PERIOD.

By Dr. H. E. Sauvage, Museum of Natural History, Jardin des Plantes, &c.

The Ethnographic History of existing Savages shows that all nomadic races are strongly addicted to both fishing and the chase.

To hunt the wild beasts of the forest, to capture the birds of the thickets and plains, and to seek for the inhabitants of the waters must necessarily be the continuous and urgent occupation of people living from hand to mouth and getting their food day by day.

Their migrations have followed the courses of the rivers, partially or altogether, whether by hordes or families—these being the most convenient lines of communication, affording food easily and abundantly, and thus leading the nations along tracks marked out by nature.

We easily see how, under such conditions of life, Fish must must have entered largely into the food-supply of primitive peoples, and that the prehistoric savage must have employed every means in his power to obtain such an article of food always at hand. Thus we may regard the early inhabitants of Europe as occupied in fishing as well as hunting from the beginning.

It is true that we have no positive evidence of Fishing in the "Mammoth-Period." It has, however, been pointed out that the large, roughly chipped flint implements, lanceolate or ovoid in shape, and known as "langues de chat," may have served to make holes in the ice during winter whereat to catch fish or amphibious animals frequenting the great rivers at that time* (see Prestwich "On the Geology of the Deposits containing Flint Implements" &c., 'Phil. Trans.' vol. cliv. p. 286).

The Esquimaux, contemporary with our civilization, partly remain in the "Stone Age," employing analogous implements of stone for similar purposes; and it is known that throughout the Arctic Regions the natives make holes in the ice and patiently wait for hours at the aperture until the Seals, coming to the surface to breathe, can be struck and secured for food. Amphibious Mammals probably ascended the Quaternary Seine and Somme under the rigorous climate

* [Some roughly dressed flints found in the Quaternary Gravels may have been "sinkers" and imitation baits, such as the Esquimaux use in fishing and angling.—Editor.]

then existing; and the natives had then possibly the same habits as existing savages now have: and as some support to this hypothesis, we know that the above-mentioned flint implements are always found in aqueous deposits, and often accumulated in certain quantities and at one point, having been of little value, and easily lost by falling through into the water.

After the age of the *extinct animals* follows that of the *retreating animals*: of this latter age we know numerous Stations, where we discover also Man, with indications of his manners and customs. This "Reindeer Age," with which the patient and conscientious researches of Edouard Lartet and Henry Christy have made us acquainted, has chiefly furnished us with information respecting the modes and results of Fishing in the Quaternary Period.

The ethnography of the present natives of the North, among whom the Reindeer is still a principal source of food, gives valuable suggestions as to the probable habits of the Quaternary people of the Reindeer Age.

The same wants must have given rise to the same habits and the same industries. Nilsson* says:—

"Indeed, it is hardly possible to explain the close resemblance between the fishing-tools and hunting-weapons of savage nations the most distinct as to time, place, and origin, without assuming that all of them, in one and the same low degree of civilization, contrived these hunting-weapons instinctively, and in consequence of a sort of natural necessity."

So also the North-American Indians, on the Pacific coast especially, employing weapons and tools similar to those used in the "Reindeer Age" in Dordogne†, use the same implements in the same or nearly the same kind of fishing.

Throughout the breccia with worked flints and the *débris* with bones in the caves and shelters of the South of France, both in Dordogne and the neighbouring regions, the remains of the Salmon are met with in great abundance; and it is probable that this Fish served largely for food among the people of the "Reindeer Age," just as in our day it is a valuable article of food among northern savages. The manners of these peoples supply us, without doubt, with many data in forming a notion of the habits of the prehistoric people under similar conditions of life.

Every traveller—Vancouver, Mackenzie, Franklin, Bogg, Lord, and others—tells us of the enormous resources which the Salmon-fishery furnishes to the natives. Vancouver informs us that the natives of Cook River eat dried Salmon. According to Mackenzie, Salmon constitutes almost exclusively the food of the

* 'The Primitive Inhabitants of Scandinavia,' by Sven Nilsson, 3rd edit. (edited by Sir J. Lubbock, Bart.), 8vo, 1868, p. 104.

† See above, pp. 43 &c.

Tribes on the Mackenzie and the rivers Anah-yoe and Tacoutche. It is the same in California, according to Mr. Edward F. Chever ("The Indians of California," 'American Naturalist,' vol. iv. no. 3, May 1870, pp. 138, 141), and in Columbia and Vancouver, according to Mr. J. K. Lord ('The Naturalist in Vancouver's Island and British Columbia,' 2 vols. 8vo, London 1866) and Mr. Bogg ("The Fishing Indians of Vancouver's Island," 'Memoirs read before the Anthropological Society of London,' vol. iii. 1870, p. 260).

According to a note with which we have been favoured by our friend M. A. Pinart, who also has traversed these little-known regions, the Salmon at certain seasons of the year is so common in the Fraser River and its tributaries that there is no need of fishing-implements; but the natives stand in the shallow parts of the river, and with their hands throw out the fish to the banks, where the women dispatch them.

Mr. Lord reports the same fact thus:—"Quoting from Dr. Scouler, 'Observatory Inlet (which I should imagine to be just such an inlet as Puget's Sound) was frequented at the time by such myriads of the Salmon that a stone could not have reached the bottom without touching several individuals, their abundance surpassing imagination to conceive.' He goes on to say that in a little brook they killed sixty with their boarding-pikes" ('Naturalist in Vancouver' &c., p. 56). Lord himself states that "Thirty Salmon an hour is not an unusual take for two skilled Indians to land on a stage," with their hoop-nets (*op. cit.* p. 69).

These Salmon, so abundant in North-west America, belong to several species—at least in Vancouver and British Columbia. At Victoria in June and July great numbers of *Salmo quinnat* of Richardson arrive, and another species (*S. Gairdneri* of Richardson) at the same time. These are the summer Salmon; but the autumn has its Salmon almost as plentiful, though not equal in quality. A little after *S. Gairdneri* comes *S. paucidens*, Richardson; in October the *S. lycaodon* of Pallas; and last of all *S. proteus*, Pallas.

Unfortunately we have no materials for the study and comparison of the osteology of these different Salmons; hence it is impossible for us to refer any of the Salmon-bones found in the Reindeer Caves to one rather than another of these species. Indeed we have been unable to recognize any difference between the Salmon vertebræ from the Caves and those of the living *Salmo salar*, Linné, although we have taken care to compare vertebræ from the same region and of the same size, derived from individuals presumably of the same age.

We know that the Salmon has a very wide geographical distribution, the same species being met with in Scandinavia, Russia, Germany, France, Galicia, Britain,

Iceland, and in North America, according to Mitchell, Storer, Richardson, Dekay, Günther, and other naturalists; the Salmon reaching very high latitudes.

The Mammalian Fauna of the Reindeer Age is that of the boreal regions of to-day; the Birds killed by the Cave-dwellers of Périgord are the Birds of this region; the Shells they used for ornament, obtained from the shores of the Atlantic and Mediterranean, are such as live there still. It is therefore highly probable, not to say certain, that the existing *Salmo salar* was the common Salmon of the Dordogne, affording food to the Cave-dwellers of the Vézère.

Two of the Salmon tribe were caught by these people—one the Salmon, and the other a smaller fish, a Trout, doubtless the Common Trout (*Salmo fario* or *Trutta fario*). This species, common in Scandinavia, Iceland, Scotland, England, Ireland, Germany, and France, is far less abundantly distributed among the hearth-stuffs of the Caves than the Salmon, though we have seen numerous vertebræ from the Stations of La Madelaine, Laugerie Basse, Bruniquel, Gourdan, La Vache-noire, &c.

The habits of the Salmon explain, perhaps, how it is that this fish is found in certain Stations of the "Reindeer Age," though wanting in others—namely, because the Salmon ascends only rivers with calcareous beds, and it appears that they avoid those flowing on granite or the old rocks. In North America the Salmon have the same habits; and according to Mackenzie the river Anah-yoe, abounding with Salmon, runs on limestone.

It is thought pretty generally that the Man of the "Reindeer Age" was stationary—there being found, among the *débris* of their cooking, accumulated in the caves and shelters where they lived, bones of Fawns and Deer of all ages. According to M. E. Piette, however, who has studied with great care the Cave of Gourdan in the Pyrenees, this simply proves that they did not come here to reside for a fixed period; they came there to lodge at one season or another indifferently, coming and going according to the quantity of game at hand ('Bulletin de la Société d'Anthropologie de Paris,' 2e sér., vol. viii. pp. 413 &c., 1874; and 'Matériaux' &c., 2e sér., vol. v. pp. 53 &c.).

It is now an accepted fact, it seems, that the people of the Reindeer Age were migratory. We might perhaps suppose that the shells from the Mediterranean and the Atlantic, with which they loved to decorate themselves, were procured by exchange; but we cannot deny that these people had themselves seen the marine animals, figures of which they engraved, very often with a scrupulous exactness, as if the animal had been drawn from nature. M. Piette, among the objects collected by him in the Cave of Gourdan, has one representing a Seal;

nor can we mistake the accurate reproduction of this mammal on a Bear's tooth (fig. 84) from the Duruthy Cave, near Sorde, excavated by MM. Louis Lartet and Chaplain Duparc*.

Fig. 84.

Outline of a Seal on a Bear's Tooth from the Duruthy Cave: collected by MM. Lartet and Duparc.

It is possible also that, like the North-American Indians, the Cave-folk of Southern France would migrate in search of Salmon. Mr. Lord† tells us that about three weeks before the arrival of Salmon the Indians of Vancouver and British Columbia begin to collect together from all sides, with their wives, children, dogs, horses, lodges, weapons, and skins, under the guidance of a chief, who directs the fishing, and divides the products amongst the tribe.

It is an interesting fact that among the numerous Salmon-remains from the Caves, which we have examined, we have not met with an entire skeleton, having seen only portions of the vertebral column, as if only the edible portions were taken home to the Caves. The bones of the head of the Salmon, had they been there, would have been as well preserved as those of the small Cyprinoids which we find in the same deposits. These Cyprinoids, on the contrary, which constituted what we may call the every-day fishing of the Aborigines, are recognized in all parts of their skeleton. They were evidently caught near the abode, and furnished fresh food; whilst the Salmon went to form a food-reserve.

The northern people sometimes take Salmon, their principal food, at the rocks and dams of the Salmon-leaps; sometimes they use harpoons. Some of the bone Harpoons barbed on one or both edges, found in the Caves of Périgord ('Reliq. Aquit.' B. Plates I., VI., XIV., XXII., XXVII., and XXIX.), may well have served in fishing for Salmon and Pike. That the latter was caught by the Aborigines of the Reindeer-Period we know by the remains found in the Caverns of the Vézère

* See also 'Matériaux pour l'Histoire de l'Homme' &c., 2e sér. vol. v. p. 143, fig. 38. † *L. c.* pp. 71 & 72.

(Laugerie Basse and La Madelaine), and in those of the Pyrenees (Bagnères de Bigorre, La Vache, and Gourdan). The ancient people of this part of France have also figured this Fish, as shown on an engraved Bear's tooth* (fig. 85),

Fig. 85.

Outline of a Pike on a Bear's tooth, from the Duruthy Cave, near Sorde: collected by MM. Lartet and Chaplain Duparc.

discovered by MM. Louis Lartet and Chaplain Duparc in the Duruthy Cave, near Sorde.

The Pike (*Esox lucius*) appears to have been less used for food than the Salmon by the Aborigines. Common throughout Europe, from Scandinavia to Turkey, Northern Asia, and North America, and frequenting turbaries and marshes especially, the Pike attains a large development in cold countries; and its habitat doubtless explains why it is somewhat rare in the Caverns of South France, situated on the great rivers; whilst it is met with more frequently in Stations of later age, generally established near marshy districts.

Together with the Salmon and the Pike some other Fishes were taken by the Cave-dwellers of Périgord. We have found in their hearth-stuffs the remains of the White Bream (*Abramis blicca*), now common in Holland, England, France, and Germany; also remains of the Bream or Carpbream (*A. brama*), which lives in Sweden and as far as the Pyrenees, of the Dace (*Squalius leuciscus*), now distributed from the north of Europe to the Pyrenees, and of the Chub (*S. cephalus*), which has the same range. The Aborigines figured also some of these Fishes. There can be no mistaking a Cyprinoid in the Fish outlined on a piece of antler, from La Madelaine, in B. Plate II. fig. 1, thus described above, at page 13:— "A cylindrical piece of Reindeer Horn, on which are carved two outlines of Fishes, one on each side. In the figure here given the form of the head, the shape of the gills, an obscure indication of the back-fin, and the proportions and general appearance permit us to refer this Fish to one of the freshwater kind, probably of the Cyprinoid (Carp) family. . . . . Similarly engraved pieces of bone,

* See also 'Matériaux pour l'Histoire' &c., *tom. cit.* p. 142, fig. 37.

bearing figures of Fishes, are worn (we are told by Mr. Francis Poole) by some of the Indians, of North-west America as Charms, when sailing across Queen Charlotte's Sound." We can add that we have seen similar specimens in the collection brought home from Alaska by M. Alphonse Pinart.

An outline of a Fish engraved on a Reindeer jawbone, from Laugerie Basse, and in M. de Vibraye's collection, seems referable to a *Squalius*, as shown in the annexed woodcut (fig. 86).

Fig. 86.

Outline of a Fish (*Squalius*) engraved on a Reindeer Jaw, from Laugerie Basse. In the Collection of the Marquis de Vibraye.

Several figures, on bone, from the Caves represent an Eel-like animal, either a Snake or an Eel. We think it rather improbable that it is the latter animal which the primitive artists wished to figure; for they would have indicated, with their usual exactness, the fins of this Fish; nor have we recognized its bones among the *débris* of the habitations of these people.

To resume, the Salmon appears to have been of great importance as food with the Cave-dwellers of Périgord, and it is probable that they migrated in search of this Fish; whilst in their every-day fishing they caught Trout, Pike, Bream, White Bream, Dace, and Chub.

[NOTE.—For some remarks on the Art of Fishing among Prehistoric People, see M. G. de Mortillet's memoir 'Origine de la Navigation et de la Pêche,' 8vo (pp. 48): Paris, 1867.—EDITOR.]

XXIII.

OBSERVATIONS ON THE BIRDS WHOSE BONES HAVE BEEN FOUND IN THE CAVES OF THE SOUTH-WEST OF FRANCE. By M. Alphonse Milne-Edwards, M.D. &c. &c., Jardin des Plantes, Paris.

The number of the species of Birds the remains of which have been found in the Caves of the South-west of France is very considerable, especially when compared with that of the Mammalia from the same beds. Many of these birds have been brought thither by Man to serve for his sustenance; other species probably inhabited those caves, or sought shelter there during the day; others may have been carried there by currents of water; but these last are certainly few.

In order to account satisfactorily for the character presented by the ornithic fauna of the Caves of the Aquitanian region, it is necessary not only to draw up the list of the species which have been discovered there, but also to indicate the relative abundance of the bones of each; for one bird may be represented only by a single piece of the skeleton, while others will have left hundreds of remains. This study may supply valuable information: it shows us that certain species were evidently sought for by the inhabitants of the Caves; for their bones abound, and the delicacy of their flesh well justifies the pursuit to which they were exposed.

It is equally useful to examine particularly the fauna of each of the Stations where excavations have been made; for some of them present a special character. I shall therefore, first, point out, in zoological order, which are the Birds whose presence I have been able to recognize in the Caves of Ancient Aquitania; and then, passing in review successively each of the Stations explored, I shall specify what species have been found there.

ACCIPITRES DIURNI.

1. The Tawny Eagle. *Falco fulvus*, Linn.; *Aquila fulva*, Savigny.—L'Aigle fauve.

This species is everywhere rare in the Caves. That of La Madelaine (Dordogne), explored in 1863 by MM. Lartet and Christy, has furnished us with the remains of only one individual; these consist of two femora, one ulna, a metacarpal, and several ungual phalanges. All these bones are more or less broken; and the ulna bears traces of the teeth of small Carnivores. The osseous

tissue of the metacarpal is altered in places, and presents in the carpal region such exostoses as those resulting from violent contusions. The bones are smaller than those of *Aquila imperialis*, Bechstein, and are also distinguished from them by their less squat forms, and less prominent muscular ridges.

In the Station of Bruniquel an ulna and several digital phalanges were found, which appear to belong to the same species. Other phalanges come from the Moustier Cave and from that of Lacombe-Tayac (Dordogne); and, lastly, a fragment of a sternum was discovered in the Gourdan Cave, near Montrejeau (Haute Garonne), by M. Piette; but it is impossible to be certain if these last belonged to the Tawny Eagle or to an allied species, such as the Imperial or the Golden Eagle: the materials for the determination are wanting. The Tawny Eagle is not commonly seen in Périgord: it is common and remains throughout the year in the Alps, but it is rare in the Pyrenees.

2. The Screaming Eagle. *Aquila clanga*, Pallas?—L'Aigle criard.

To this species, I think, should be referred a nearly perfect leg-bone found in the Cave at Massat (Ariège). I hesitated much for a long time about the identification of this tarso-metatarse, the length of which is about the same as in *Aquila fulva*; but the proportions are different, the bone being more slender, and narrower at the articular extremities. On the other hand, it is stouter than that of the Spotted Eagle (*Aquila nævia* of Brisson), and even than that of the Barred-tailed Eagle (*A. fasciata*, Vieillot). But having recently procured the skeleton of the Screaming Eagle, I found that the leg-bone of the female of this bird had almost exactly the same dimensions as our fossil; I am therefore led to believe that the bird of the Massat Cave differed in nothing from *A. clanga*. At the present day the latter does not show itself in France, but is met with in Poland and Germany; and it is common in Southern Russia and the adjacent parts of Asia, where it prefers to remain in the vicinity of rivers, lakes, and marshes.

A humerus found by M. E. Lartet in 1860, in the celebrated Human Station of Aurignac (Haute Garonne), seems to me to have belonged to the same species.

3. The Common Sea-Eagle. *Vultur albicilla*, Linné; *Haliæetus albicilla*, Leach. —Le Pygargue ordinaire.

The only bones of this Bird which I have ever been able to study came from the Cave at Gourdan, where they had been found by M. Piette. The researches made in the lakes of Switzerland have led to the discovery of a number of remains of the Sea-Eagle; but until now the presence of that bird had not been noted in the

ossiferous caves. This species, however, is not rare in France; thus it is often seen on the coasts of the Channel, where it is in passage in autumn. It is more common in all parts of Russia and in Northern Asia.

4. The Common Buzzard. *Falco vulgaris*, Linné; *Buteo vulgaris*, Bechst.—Le Bute vulgaire.

The deposit at Aurignac likewise furnished to M. E. Lartet a tibia of a Bird of prey which I have determined as having belonged to a Buzzard of large size. At that time I said:—"Although in size this lower extremity of the tibia exceeds the ordinary dimensions in most of the individuals of this species which I have had the opportunity of examining, the osteological characters are identical, so that it appears to me impossible to attribute this fossil to any other specific type than that at present living in Europe"*.

I have since been able to compare this bone with those of a very great number of individuals of the same species, and have found in adult females of the common Buzzard proportions nearly identical with those of the Aurignac fossil.

A tibia of a Buzzard found at Bruniquel presents nothing peculiar in its dimensions; and some ungual phalanges seem also to belong to this species. I have likewise recognized its presence in the Cave at Gourdan. Marcel de Serres mentioned this bird as having been found in the Caves in the Department of the Aude; but that author's determinations are so uncertain that it is impossible to accept them uncontrolled.

5. The Common Falcon. *Falco communis*, Gmelin.—Le Faucon ordinaire.

The Family of the Falcons is represented in the Caves of Aquitania by three species; but up to the present moment the large Falcons of the north have not been seen there. Thus no trace has been found of the presence in France, at that period, of the White Gerfalcon, of the Iceland Gerfalcon, or of that of Norway. The common Falcon has not left numerous remains; and hitherto I have only seen one humerus of this bird, from the Cave at Lacombe-Tayac.

6. The Hobby. *Falco subbuteo*, Linné.—Le Faucon hobereau.

M. Piette found, in the diggings he made in the Cave of Gourdan, a humerus of a Falcon smaller than that of the common Falcon, but larger than that of the Kestrel (*F. tinnunculus*). When studying for the first time this bone, I could not refer it to any species living since that epoch; but I have lately compared it with its analogue in *F. subbuteo*, and find that it presents all the characters peculiar to

* Recherches pour servir à l'histoire des Oiseaux fossiles, tome ii. p. 470, pl. 187. figs. 8–10.

the humerus of the females of this species, the size of which is always a little larger than that of the males. M. Lartet also collected at Massat another arm-bone of a Falcon which I think can be identified with this species. The Hobby now inhabits all Europe, a part of Asia, and the north of Africa. It is rather common in the north of France and in Germany.

7. The Kestrel. *Falco tinnunculus*, Linné.—Le Faucon cresserelle.

Of all the Birds of prey the Kestrel is the most common in France, where it nests in holes in the rocks, and sometimes even on trees; it is also the Hawk whose bones have been most frequently found in the Caves. That at Lacombe-Tayac has furnished some remains of it, especially a tarso-metatarsal and several humeri. Several tibias and some ulnas were collected at Bruniquel; a leg-bone was found in the Grotte des Demoiselles (Dordogne): this bone is a little larger than usual, but in other respects presents all the characters proper to *Falco tinnunculus*. I should also mention a tibia from the Cave of Gourdan. I have likewise ascertained the presence of this species in the Cave at Verezzi in Liguria*; but together with it was found the *Falco cenchris*, Naum., the existence of which has never been noticed in the Caves of the South-west of France.

8. The Royal Kite. *Falco milvus*, Linné; *Milvus regalis*, Brisson.—Le Milan royal.

A humerus from the Station of Aurignac is the only relic of this Bird which has hitherto been found in the prehistoric deposits, either in France or in other countries†. The Royal Kite is nevertheless far from rare in the South-west of France, principally in the Department of Landes, where it is a constant resident.

9. The Bearded Vulture. *Vultur barbatus*, Linné; *Gypaëtus barbatus*, Temminck.—La Gypaëte barbu.

A fragment of the upper mandible of this species was found in the Cave at Lacombe-Tayac. This part is so well characterized in the *Gypaëtus* that there can be no uncertainty about its determination; I have given a figure of it in my work on Fossil Birds‡.

An ulna and a humerus collected at Bruniquel belong to this same species, which nowadays lives in the Pyrenees as well as in the Alps, in the north of Africa, and extends even into Asia as far as the chain of the Himalayas.

* Ramorino, "Sopra le Caverne di Liguria," Atti dell' Accademia delle Scienze di Torino, Ser. 3, t. xxiv. p. 29. † See A. Milne-Edwards, *op. cit.* t. ii. p. 472, pl. 187. figs. 16, 17. ‡ *Op. cit.* pl. 188. figs. 1–3.

10. The Vulture. *Vultur monachus*, Linn. ?—Le Vautour.

I have been able to recognize the bones of the Vulture in several ossiferous caves:—at La Madelaine, upon the banks of the Vézère, 3 imperfect ulnas; at Lacombe-Tayac, 1 metacarpal; at the Gorge d'Enfer (Dordogne) and at Gourdan, 1 ulna. Other wing-bones of very large size come from Aurignac. From the condition of these bones it seems that the inhabitants of the Caves carefully sought after them, their dimensions being considerable, and their remarkable pneumatic state permitting them to be easily converted into pipes. Indeed the ulnas are generally broken so as to separate the articular extremities; and on several of them we observe outlines or regular lines. On one of these bones, found at La Madelaine, is seen the figure of an animal destitute of horns, the form of the head of which recalls that of the Horse. The hind quarters of the animal are wanting, the bone being broken in front of the hind legs. On the opposite surface there is a straight and deep furrow extending the whole length of the bone. On another ulna, of which I have only the upper portion, it seems that the artist intended to engrave an arrow-head or a barbed lance-head similar to those found in the same beds, some of which have been figured in this work *; on the other side are a great number of lines of more or less depth, the signification of which it is difficult to guess. On a third ulna, also from La Madelaine, there are numerous furrows produced by means of an extremely sharp flint; these are short, crowded, and all arranged on the inner surface and following the length of the bone; those nearest the carpal extremity are larger and deeper than the others. This bone bears also the marks of the teeth of Rodents.

All these bones seem, by their size and strength, to belong to *Vultur monachus* rather than to *V. fulvus*; nevertheless, in order to fully establish their determination, it would be useful to examine more perfect specimens than those which I have had at my disposal.

ACCIPITRES NOCTURNI.

11. The Eagle Owl. *Strix bubo*, Linné; *Bubo maximus*, Flem.—Le Grand-duc.

This species, already noticed in the Département de l'Aude by Marcel de Serres, and in the Cave at Verezzi, has also been found in the Cave at Gourdan.

12. The Short-eared Owl. *Strix brachyotus*, Linné; *Otus brachyotus*, Boie.—Le Hibou brachyote.

It is only in the Shelter of Bruniquel that a bone (a tarso-metatarsal) of this Bird has been found.

* See B. Plate XIV. figs. 3 & 6.

13. The Common Barn-Owl. *Strix flammea*, Linné.—L'Effraye commune.

The presence of this species at Bruniquel is indicated by a tarso-metatarsal bone and by a humerus. They are the only proofs we possess of the presence at that epoch of an Owl which is nevertheless now so common in France.

14. The Common Sparrow-Owl. *Noctua minor*, Brisson.—La Chevêche.

M. P. Gervais had already recognized some bones of this species in the Cave at La Tour de Farges, not far from that of Lunel Vieil*. I again found this same Owl in the Cave of Verezzi in Liguria†, and at Bruniquel, where a tibia and a tarso-metatarsal were collected in a good state of preservation.

15. The Little Sparrow-Owl. *Strix passerina*, Linné; *Glaucidium passerinum*, Boie.—La Chevêchette.

M. Lartet forwarded to me, a little before his death, a very small tarso-metatarsal found by him at Aurignac. This bone appears to me to have come from *Glaucidium passerinum*‡. It is very different from its analogue in the Scops Owl and the Sparrow-Owl; it is much shorter and more expanded, not merely in its articular portions, but also in its diaphysary part. By its proportions it approximates very nearly to the tarso-metatarsal of *Glaucidium phalænoides*, a small Owl found in the Antilles, but it is still broader.

Glaucidium passerinum is now common in the cold regions of the Old Continent; in Norway it is found in the Conifer-woods, where it feeds chiefly on small Rodents, and, in case of need, on Bats and small Birds.

Schrenck, and afterwards Radde, met with it in Siberia. It has been noticed also in Poland and Lithuania; but it is rare and has only accidentally been seen in Germany. Yet it appears sometimes to wander further southward, especially following woods of the large mountain-chains; thus it has been met with in Savoy and Switzerland. The Little Sparrow-Owl, therefore, at the present day may be regarded as an arctic species; and its presence in the Caves, where the remains of the Reindeer are accumulated, is another fact to be added to the list of proofs of a low temperature at that period.

16. The Snowy Owl. *Nyctea nivea*, Bonap.; *Strix nyctea*, Linné.—Le Harfang.

The remains of this species are met with in abundance in most of the Caves in the South-west of France; and it is certainly one of the most interesting that

* Zoologie et Paléontologie française, 2nd edit. p. 419.

† Ramorino, *op. cit.* p. 29.

‡ *Strix passerina*, Linné, Système Naturel (1766), t. i. p. 133.

have hitherto been remarked there. It no longer belongs to our fauna, but is banished to the coldest regions, not only of Europe, but of America; it has therefore followed the Reindeer in its successive migrations; and, like that Mammal, its presence in France may be considered a sure indication of a relatively very low temperature at the period of its living there.

In Norway the Harfang is not rare, and the number of individuals seems to be in relation to that of the Lemmings. Mr. Dresser, in his excellent 'History of the Birds of Europe,' gives us some interesting information on this subject, for which he was indebted to Mr. Collett of Christiania:—"In the summer and autumn of 1872, immense numbers of Lemmings (*Myodes lemmus*) migrated south and north from the Dovrefjeld and its ramifications, also from the fells in Sondre Throndhjems Amt, whence they made their way along the frontier towards Jemtland in Sweden. In these localities the number of Snowy Owls was observed gradually to increase, becoming in the course of the summer much greater than had been the case even of late years under similar circumstances"*.

In the north of Sweden and in Lapland the Snowy Owl is less common, although frequently met with.

In Siberia, Middendorff mentions it among the birds which are not rare. Schrenck found it further southward, in the valley of the Amoor, but only in winter; and Radde assures us that during that season it extends into Mongolia. In these different localities it feeds principally on *Lagomys ogotoma*.

In North America it abounds, and remains there throughout the year within the coldest regions. According to Mr. Elliott Coues, it frequents the parts which are destitute of forests, where, just as in Norway, its food consists principally of Lemmings, which it hunts in the daytime as well as in the evening.

In Greenland it is more common in the north than in the south; it is rare in Spitzbergen, as well as in Iceland.

The Arctic regions, then, may be regarded as the present home of the Harfang; but it sometimes appears outside those limits, though in an irregular manner. Thus, during the winter, it is sometimes seen in Poland, the north of Germany, and even in Bohemia. It appears almost every year in Denmark. Lastly, from time to time stray individuals have been noted in Holland, in the British Isles, and even in France, where, Degland informs us, a young one was killed near Abbeville. But these isolated cases must be considered accidental; they are birds that have lost their way, having removed further and further, during severe winters, from their usual habitat.

* A History of the Birds of Europe, Part xxiii. & xxiv.: *Nyctea scandiaca*, p. 9.

On the contrary, at the epoch of the filling of the Caves, the Harfang was one of the commonest species in France; it must have found there the biological conditions, both of climate and food, which are necessary for it to-day. Rodents, therefore, were probably present; we know, however, that it eats also some Birds, especially Ptarmigan. At Spitzbergen, where Rodents are wanting, the Snowy Owls subsist on *Lagopus hemileucurus*. Now it is known that species of the latter genus were formerly very numerous in France; and they may have served as food for *Nyctea nivea*.

In the Cave of Les Eyzies nearly all the parts of the skeleton of these birds have been found—among others a tarso-metatarsal bone in a perfect state of preservation. This bone, by its conformation, would alone be sufficient for the rigorous determination of the Harfang. The ulnas, on account of their solidity, are pretty plentiful; I have counted seven of the same side; on one of them a deep spiral furrow has been traced with a flint.

The Station of La Madelaine has furnished six humeri, two tibias, two femurs, several coracoids, and a few ulnas. In that of Laugerie Haute, a fragment of a humerus proves the existence of the species; while at Lacombe-Tayac no remains of it have been met with; at Bruniquel an arm-bone, a beak, and some digital phalanges are the sole indications of the presence of this bird. At Massat the number of Harfang bones is small; I have seen only three from that locality. In the Cave at Lherm, on the contrary, M. Filhol has found them in abundance. This learned naturalist has kindly sent me the specimens he collected there; and among them I have found five coracoids, four scapulas, eight humeri, several tibias, and other bones, such as ulnas, femurs, and metacarpals. At Aurignac a single humerus has been discovered. At Gourdan *Nyctea nivea* is not rare; I have recognized several bones of this Bird among those sent me by M. Piette. The Spanish Caves and those in Liguria, the fossils of which I have been able to study, contain no remains of the Harfang; nevertheless it is probable that some exist in the breccias of Sardinia*.

PASSERES.

17. The Raven. *Corvus corax*, Linné.—Le Corbeau ordinaire.

The Raven is very common in the northern countries, in Iceland for instance, and in Northern Asia; but it inhabits France also, and breeds there. Its presence in the Caves of Périgord is not surprising: it is, however, to be

* See 'Recherches pour servir à l'Histoire des Oiseaux fossiles,' t. ii. p. 501.

remarked that in these it is always rare. At La Madelaine a humerus, in a fair state of preservation, of an adult individual has been found. I have recognized, among the fossils from the Station of Lacombe-Tayac, two other humeri, younger, a coracoid, and a metatarsal; a coracoid was found at Bruniquel. In the Gourdan Cave also some remains of the Raven have been met with. And M. E. Lartet sent me a coracoid and an arm-bone collected by him at Aurignac: the coracoid presents nothing peculiar; but the humerus is larger than any of those of the same species which I have seen.

18. The Carrion-Crow. *Corvus corone*, Linné.—La Corneille.

I have found this species in the Cave at Lourdes, in that of Aure, and in the Station of Lacombe-Tayac.

19. The Hooded Crow. *Corvus cornix*, Linné.—La Corneille mantelée.

This Bird is represented, in the collection made by M. Piette at Gourdan, by a humerus and a portion of the beak. *Corvus cornix* inhabits in preference the North of Europe and North Asia. In winter it arrives in France, proceeding as far as Languedoc, Provence, and Dauphiny; but it is rarely seen in Périgord.

20. The Jackdaw. *Corvus monedula*.—Le Couchas.

The Station at Le Moustier, on the banks of the Vézère, has furnished a humerus and a tibia—the sole indication we have of the existence of this species at the time of the infilling of the Caves; and the circumstances under which these bones were found do not permit it to be included with perfect certainty in the list of the Birds of that period; for M. E. Lartet, when sending the bones to me, stated that they were taken from no great depth, in company with numerous remains of Rabbits which seemed to be of recent date. It is possible, therefore, that their burying was not contemporaneous with that of the remains of *Elephas primigenius* and *Hyæna spelæa* which were taken from the cave-earth of the same Station.

21. The Alpine Chough. *Corvus pyrrhocorax*, Linné; *Pyrrhocorax alpinus*, Vieillot.—Le Choeard des Alpes.

The remains of *Pyrrhocorax alpinus* are very common in the Caves, not only of Périgord and the Pyrenees, but also of the South-east of France, and even of Italy. For a long time they were confounded with those of the Magpie and the Jay. Nevertheless it is easy to distinguish them; for though some of the bones are similar (the ulnas and metacarpals for example), the tarso-metatarsal, tibia,

and humerus present very different characters. I have elsewhere* pointed out the peculiarities by which they may be distinguished, and so need not repeat them here. The Shelter at Lacombe contains many bones of the Chough; I have recognized there about a score ulnas, 13 tibias, 4 femurs, 4 humeri, 5 metacarpals, 3 metatarsals, and 2 coracoids. At Les Eyzies they are rarer; I have seen only one humerus and two tarso-metatarsals. It is the same in the Cave of l'Eglise (Dordogne). At Bruniquel M. Pecado collected several leg- and foot-bones. At Massat, all the bones determined by M. Fontan as those of the Magpie and the Jay belong to the Chough; and the same is true of those collected by M. Puel in the Cave at Breugues, and considered by that explorer to be those of the Magpie. From the Cave at Lherm I have seen but few remains of the Chough; among the numerous fossils sent me by M. Filhol I have recognized only two humeri and one coracoid of this Bird. I have also noticed its presence in the Gourdan Cave†, and at Aure, Lourdes, and La Northe (Bouches du Rhône).

The Chough is not rare, at the present day, in the Alps and the Pyrenees. In summer it remains in the mountains, but in winter it descends to the plains.

22. The Cave-Chough. *Pyrrhocorax primigenius*, n. sp.—Le Chocard des Cavernes.

Several leg-bones, found in the Cave at Massat (Ariège), presenting all the characters peculiar to the genus *Pyrrhocorax*, differ from those of the Alpine Chough by their much larger dimensions. They cannot be mistaken for their analogues in the other Corvidæ, because the osteological peculiarities are in this genus very clearly marked. I therefore think that the Bird to which these bones belonged must here be recorded, at least provisionally, under the name of *Pyrrhocorax primigenius*.

23. The Cornish Chough. *Corvus graculus*, Linné; *Fregilus graculus*, Cuvier.—Le Crave.

This species has been found as yet only at Gourdan.

24. The Nutcracker. *Corvus caryocatactes*, Linné; *Nucifraga caryocatactes*, Temm.—Le Caisse-noix.

I have recognized several foot-bones of this Bird in the Caves at Lacombe and Massat. They are a little larger than those of the common Nutcracker; but

* Recherches pour servir à l'Histoire des Oiseaux fossiles, tome ii. p. 401, pl. 196. figs. 1–10, pls. 197, 149. figs. 6–10.

† Piette, *op. cit.* p. 25.

we know that individuals of this species inhabiting Sweden and Lapland are generally of a larger size than those of the temperate regions of Europe; Brehm has even described them under the name of *Nucifraga brachyrhyncha*. They have the beak stronger and more arched, and the feet more robust. It is possible that in the Reindeer Period the Nutcracker in France had the characters of those which now live in Scandinavia and appear to constitute a well-defined local race.

25. The Magpie. *Corvus pica*, Linné; *Pica caudata*, Linné.—La Pie.

The bones of this species are not met with in the most ancient Stations of the Aquitanian region; they have been found only at Lacombe-Tayac and Gourdan, and even there are very rare; I have seen only two humeri.

26. The Crossbill. *Loxia curvirostra*, Linné.—Le Bec croisé.

A humerus, a coracoid, and a tibia, probably belonging to the same individual, have been collected at Massat (Ariège). This *Loxia* is at the present day very common in the north of Europe, and even in Greenland, but it is a bird of passage in France.

27. The Greenfinch. *Loxia chloris*, L.; *Ligurinus chloris*, Koch.—Le Verdier.

I have pointed out the existence of this species in the Gourdan Cave; but M. Piette, who had extracted it, has informed me that he found it in a fissure of the rock at a depth of only 70 centimètres (2 feet 7·5 inches); and its state of preservation made me doubtful of its antiquity.

28. The Snow-Finch. *Fringilla nivalis*, Brisson; *Montifringilla nivalis*, Brehm. —La Niverolle des neiges.

The Stations of Bruniquel and Massat contain remains which I regard as appertaining to this species; they consist of a humerus, a tibia, and a foot-bone. It is interesting to find the Snow-Finch in the beds where Lagopodes also abound; for in the present day it lives on lofty mountains together with the latter, in the vicinity of the snow, and only accidentally makes its appearance in the centre and south of France at a distance from the chain of the Pyrenees.

29. The Sky-Lark. *Alauda arvensis*, Linné.—L'Alouette des champs.

A humerus found in the Station of Le Moustier belongs to this species.

30. The Mistletoe-Thrush. *Turdus viscivorus*, Linné.—La Draine.

This Bird, the existence of which in the Cave at Verezzi, Liguria, I have

already noticed, has also been met with at Lacombe-Tayac, where I have recognized a nearly entire metatarsus, a tibia, and a humerus. Parts of the skeleton of Passeres do not appear to be very rare in the Cave-deposits; but their size renders it difficult to distinguish them; and their fragility is such that the leg-bones are almost always broken. It is generally the humerus that is best-preserved, on account of its more squat form and greater solidity.

31. The Waxwing. *Ampelis garrulus*, Linné.—Le Jascur de Bohême.

A humerus and an ulna from the Cave at Lherm evidently belong to this Bird, which is a species not seen now in France, except at distant intervals. It inhabits the eastern parts of the north of Europe and Asia.

32. The Redstart. *Motacilla phœnicura*, Linné; *Ruticilla phœnicura*, Bonap. —Le Rouge-queue des murailles.

The Lherm Cave has likewise yielded a humerus which I think should be referred to the Redstart. This species is widespread in France, and is seen among rocks or near old walls, in the holes of which it usually builds its nest.

33. The Crag-Martin. *Hirundo rupestris*, Scopoli.—L'Hirondelle de rocher.

At the time of the excavations which I undertook, with M. E. Lartet, in the Cave at Lourdes, I collected two small humeri which agree with the Crag-Martin. The arm-bone of the Swallows is easily distinguished from that of any other of the Passeres; and that of the species in question is more robust than in any other representative living in our regions. *Hirundo rupestris* is at the present day common in the Alps and Pyrenees. It ordinarily nests in caves or in the crevices of rocks—which explains readily its presence at Lourdes and Bruniquel, where I have likewise recognized its bones.

34. A Swallow, undetermined. *Hirundo*, sp.?

A humerus more robust than that of the preceding species has also been found at Bruniquel. I have not hitherto been able to refer it to any known species. But the elements of determination at my disposal are insufficient; and, perhaps, when I can bring together the bones of a greater number of Crag-Martins, I shall be able to assure myself that the size of this bird may be subject to more considerable variations than those I have already observed, and that in them the arm-bone may attain the dimensions of the Bruniquel fossil.

SYNDACTYLI.

35. The Kingfisher. *Alcedo ispida*, Linné.—Le Martin-pêcheur.

The Station of Le Moustier, from which we have already received bones of several species of small size, has furnished also a perfectly characterized humerus and coracoid of the Kingfisher. This species is still met with on the banks of the Vézère.

COLUMBÆ.

36. The Stockdove. *Columba livia*, Brisson.—Le Biset.

This Bird, which is rightly considered the stem of all our races of domestic Pigeons, lives in the wild state, like the Ringdove and the Dove, in almost every part of Europe, from Sweden and Norway to the shores of the Mediterranean, nesting in the most solitary and inaccessible places. Remains of this species, consisting of a humerus and a portion of an ulna, have been found in one of our most ancient prehistoric Stations, that of Aurignac. These bones, compared with those of the common Stockdove, present no appreciable difference; their general dimensions and proportions are the same. This species, therefore, so easily modified by certain influences which Man has taken advantage of to produce the variety of forms which exist in our aviaries and dovecots, has been propagated without alteration from a very remote period to our times; the Stockdove of Aurignac seems to resemble in its osteological characters that of our woods.

GALLINÆ.

37. The Willow-Grouse. *Tetrao albus*, Gmelin; *Lagopus albus*, Vieillot.—Le Lagopède blanc.

In most of the Caves numerous bones of *Tetrao* are found, especially of *Tetrao albus*. This abundance can only be accounted for by admitting that Man used those birds as food, and brought thither the produce of his chase; for if the Grouse had been carried in by Birds of prey or carnivorous Mammals, the bones would generally be broken, gnawed, and the articular heads would have disappeared, as Steenstrup has so well shown in his memoir on the bones from the Kjokkenmöddings of Denmark; while in general the various pieces of the skeleton of the Willow-Grouse are perfectly preserved, and on many of them we observe fine

striæ, or notches similar to those produced by the flint implements made use of by the men of that period to detach the flesh of the animals. The palæontologists who have explored the Cave-deposits, whether in France or the neighbouring countries, have not recognized the existence of this species, and have confounded it with the Partridge. It is true that in its dimensions it does not differ much from that bird; but the two species cannot be confounded if their osteological characters be studied.

The Willow-Grouse does not now inhabit the temperate parts of Europe; it is banished to the north, into Norway, Sweden, Lapland, and North America. It lives in the humid plains that are clad with clumps of Birch trees; but it does not appear to frequent forests, and it does not ascend the mountains above the limit of the birch-growth. It is often met with in large flocks, and is one of the commonest birds in the northern regions. Its geological and geographical distribution is the same as that of the Great Snowy Owl, which often feeds upon it.

There exist in Europe other species of the same genus which much resemble *Lagopus albus*. According to Prof. A. Newton*, of the latter the following subspecies are to be distinguished:—

(1) *Lagopus scoticus*, which is perhaps only an insular race of *L. albus*.
(2) *Lagopus mutus* vel *alpinus*, which is found also in the French Caves.
(3) *Lagopus rupestris*, which does not apparently differ from *L. islandorum* or from the *L. Reinhardti* of Greenland.
(4) *Lagopus hemileucurus*, inhabiting Spitzbergen and more nearly allied to *L. mutus* than to *L. rupestris*.

The plumage of all these birds presents a certain uniformity of tints; but the dimensions of the various pieces of the skeleton are not the same, and render their determination possible.

The number of remains of *Lagopus albus* which have been found in the Cave of Les Eyzies is very considerable; and it has been possible to reconstruct an almost entire skeleton of one of these birds.

At La Madelaine also these *Lagopodes* are very plentiful; but they are very rare at the Gorge d'Enfer, and at Massat. They are common at Bruniquel. At Aurignac their existence is only indicated by one tarso-metatarsal. In the Lherm Cave they are numerous. Lastly, their remains have been found at Aure, Lourdes, and Gourdan.

* "On certain Species of Falconidæ, Tetraonidæ, and Anatidæ," Proceedings of the Academy of Natural Sciences of Philadelphia, 1871, p. 94.

38. The Red Grouse. *Lagopus albus*, var. *major*, vel *L. scoticus*.—La Grouse.

There are often found, mingled with remains of the Willow-Grouse, bones notably larger and stouter, resembling in their proportions those of *Lagopus scoticus*; but ought the latter bird to be considered specifically distinct from the preceding? It differs little from it, except in its rather larger dimensions and in not assuming an entirely white plumage in winter. May it not be that the Red Grouse are the product of a colony of *Lagopus albus* which, a long series of centuries ago, established itself in Great Britain and propagated there without renewal from the primitive stock, and whose descendants have gradually undergone slight modifications in size and plumage*? What has been observed of the *Lagopus* fauna of the Caves seems to prove that at that period there were very notable differences in the size of these birds; but did those differences coincide with changes in the colour of the plumage? and did the largest *Lagopodes* of the Caves of the south-west of France assume the white winter plumage, or did they remain during that season more or less marked with black and red? These are questions it is impossible to settle in the present state of our knowledge; and I therefore confine myself to drawing the attention of naturalists to these considerable differences in dimensions presented by the *Lagopodes* contemporaneous with prehistoric Man.

39. The Ptarmigan. *Tetrao lagopus*, var. *alpina minor*, Linné; *Lagopus mutus*, Leach; *Lagopus alpinus*, Nilsson.—Le Lagopède muet.

This species was contemporary with the preceding; and its bones are found mingled, in the earth of the Caves, with those of *Lagopus albus*. But while the latter disappeared from France to confine itself to the Polar regions, *L. mutus* has not quitted the central parts of Europe—but has retired to the highest mountain-regions, where it finds a temperature corresponding to the needs of its organization. It is met with in the Alps and Pyrenees; these mountains form the southern limit of its geographical extension; to the north, it inhabits in great numbers the mountains of Scandinavia and Lapland.

Lagopus mutus is rarer in the Caves than *L. albus*, with which it is generally associated. It is found at Les Eyzies, La Madelaine, Massat, Gourdan, Lherm, and Lourdes. I have indicated in another work the characters by which the bones of this species may be determined and distinguished from those of the other representatives of the genus, and therefore shall not return to them here.

* Prof. A. Newton seems to entertain this view: vide *op. cit.* p. 96.

40. The Capercaillie. *Tetrao urogallus*, Linné.—Le grand Coq de Bruyère.

The Capercaillie is rare in the Caves. I first recognized its remains in the Station of Salève (near the shore of the Lake of Geneva), and at Verezzi (in Liguria); afterwards I found this species at Bruniquel and Lacombe-Tayac; but it is represented there by only a small number of bones.

41. The Black Grouse. *Tetrao tetrix*, Linné.—Le Tétras à queue fourchue.

This species, as well as the preceding, is common in the mountains of Sweden, Norway, and Germany; it is also seen in France, but is there becoming more and more rare. A few bones of it have been found in the Caves at Le Moustier and Massat.

42. The Grey Partridge. *Tetrao perdix*, Linné; *Perdix cinerea*, Charleton.—La Perdrix grise.

I have already had occasion to say that the greater part of the bones from the Caves which had been regarded as belonging to the Partridge should be referred either to the Willow-Grouse or to the Ptarmigan; such are:—those from the Cave at Brengues, cited by M. Puel; and those from Mallet and Jobertas, Fausan, Sallèles, and Bize, noticed by M. Marcel de Serres. Among the hundreds of remains of *Tetrao* sent me by M. Lartet, I have found scarcely any Partridge-bones; and it is to be observed that the beds in which they are found are generally of a more recent date than those of Les Eyzies, La Madelaine, and, especially, Aurignac: the places I allude to are the Stations of Lacombe, Les Escoutiers, Lourdes, and the Cave of L'Eglise. Partridges seem to have first appeared when Willow-Grouse quitted France.

The Caves of Old Castile, searched by M. Louis Lartet, did not contain one *Lagopus*; but Partridges were common there. At the present day the Grey Partridge is rare in the south of France, where, on the contrary, Red Partridges abound; nevertheless it is seen as far southward as North Africa.

43. The Cock. *Gallus*.—Le Coq.

Naturalists are generally agreed in admitting that the Cock is a native of Asia, and that its introduction into Europe is relatively recent. Bones of this bird, however, are found associated with those of *Ursus spelæus*, *Rhinoceros*, and the large *Felis*. In France, then, there was a species of the genus *Gallus* at a very ancient period; and it cannot be supposed that it had been conveyed thither by Man—more especially as the number of the bones found up to the present in the

ossiferous beds is very inconsiderable, and does not indicate that the Cock lived as a guest of Man.

Schmerling described some remains of it from the Caves in the province of Liége; he even figures two tarso-metatarsals too different in size for it to be possible to admit that they come from the same species: one (pl. 37. fig. 2) is short and slender; the other (pl. 37. fig. 1) is much stouter, and its spur situated much lower. M. Gervais indicates this bird as found in the Diluvial conglomerate near the Barrier of Fontainebleau; and H. von Meyer mentions its presence in the beds of the valley of the Lahn, deposited at the same period.

M. Filhol has sent to me a nearly entire tarso-metatarsal taken from the oldest layer of the Cave at Lherm (Ariège). Its lower extremity is broken; but the spur is almost perfect. This bone evidently belonged to a Cock; but it is distinguished by its shortness and antero-posterior flatness from those of all the species of the genus that I have examined. It is likewise differentiated by the narrowness of the diaphysis, which is hollowed out by a well-marked groove. The foot-bone of *Gallus Sonnerati* is thicker and longer; that of the Bankiva Cock is also longer, but it is narrower. Another tarso-metatarsal, destitute of spur, which belonged to a Hen, was found by M. Piette in the Cave at Gourdan. It is slenderer and shorter than the one from Lherm; but these differences must be regarded as sexual.

A femur found in the Station of La Madelaine approaches in dimensions that of *Gallus Sonnerati.* Another, collected at Bruniquel, is much smaller, although adult; and I can only assign it to a Hen. Lastly, to complete the enumeration of the parts of the skeleton of these birds found in the Caves, I have to mention a tibia and a coracoid from the Grotte des Fées, in the Department of the Allier.

GRALLÆ.

44. The Thick-knee. *Charadrius œdicnemus*, Linné; *Œdicnemus crepitans*, Temminck.—L'Œdienème criard.

A unique tarso-metatarsal, found at Lacombe-Tayac, must be referred to this bird.

45. The Water-Rail. *Rallus aquaticus*, Linné.—Le Râle d'eau.

Several bones of the Water-Rail have been collected at Bruniquel; they present no peculiarity worthy of notice. They are the sole indications of the existence of the bird at the period of the filling of the Caves. Other species of the same

group have been noticed in prehistoric Stations—such as *Rallus crex*, found by M. J. Desnoyers in the breccia of Montmorency, and by M. Ramorino in that of Verezzi (in Italy).

46. The Moorhen. *Gallinula chloropus*, var. *major*.—La Poule d'eau.

A humerus from Massat (Ariège) seems to me to agree with that of the common Moorhen, though it is a little larger than any of those of that species which I have examined.

47. The Primitive Crane. *Grus primigenia*, nobis.—La Grue primitive.

M. E. Lartet collected, in 1863, in the Cave at Les Eyzies, together with remains of Reindeer, Aurochs, &c., the lower portion of a tibia, which had been separated from the body of the bone, not by an accidental fracture, but evidently by the hand of Man and by means of a sharp instrument which played the part of a saw. The fragment bears also numerous longitudinal grooves made by an analogous instrument, probably for the purpose of detaching needles or arrow-points. M. E. Lartet had the kindness to send this fossil to me; and I easily recognized that it came from a species of the genus *Grus*: it presents all the characters which are special to that division; and there can be no doubt about the generic determination. But if one asks to what species it belongs, we remark that this tibia cannot have come from *Grus cinerea*, in which the principal leg-bone is much thinner. The tibia from Les Eyzies is even much larger than that of the Australian Crane. I have likewise compared it with those of the Mantchurian Crane and *Grus antigone*; and it most nearly resembles the leg-bone of the latter, though the dimensions of the fossil are greater. It is these considerations which have determined me to propose for the Crane of the Caves a new specific division, and to designate this bird under the name of *Grus primigenia*. It was a species remarkable for its large size, and has gradually disappeared before the encroachments of Man or the changes which have happened in the biological conditions, just as the Aurochs is now going, and as *Bos primigenius* and so many other species have gone.

Since the time when this determination was established, it has been confirmed by other discoveries. A portion of a humerus has been found at La Madelaine, cut a little above the articulation, by means of a flint, and having deep grooves similar to those observed on the tibia and apparently made with the same intention. A fragment of a lower mandible found at Gourdan shows that *Grus primigenia* approached nearer to *G. antigone* than to *G. cinerea*.

PALMIPEDES LAMELLIROSTRES.

48. The Wild Swan. *Cygnus ferus*, Ray.—Le Cygne sauvage.

The remains of this species are rare in the Caves; one can understand that their conveyance thither would require a concurrence of exceptional circumstances. In fact, the Wild Swan inhabits the Polar regions; and when it migrates in winter, it follows in preference the sea-shore, and only accidentally makes its appearance inland. Nevertheless I possess a tarso-metatarsal of this bird, collected by M. J. Desnoyers in the Cave at Arcy sur Cure; and among the fossils taken out of the Gourdan Cave by M. Piette I have recognized a portion of an ulna which must be referred to this species. At La Madelaine and Massat some fragments of ulnas of large dimensions, probably also from the same species, have been found; but the exact determination of these bones presents almost insurmountable difficulties, because their articular extremities have been detached, probably for the purpose of making pipes of the diaphyses.

49. The Wild Duck. *Anas boschas*, Linné.—Le Canard sauvage.

I have recognized numerous remains of the Wild Duck in the ossiferous deposit of Bruniquel, and at Gourdan and Les Eyzies.

50. The Summer-Teal. *Anas querquedula*, Linné.—La Sarcelle d'été.

I have likewise found, in the osteological collection formed by M. Brun at Bruniquel, a tarso-metatarsal and a metacarpal of the Teal.

51. The Duck. *Anas* —— ?—Le Canard.

M. Piette has submitted to me several bones from the Cave at Gourdan, which belong to a Duck of large size, with very short legs, and allied to the Eider, from which, however, it differs too much for me to identify it with that species.

I will now give a list of the species enumerated above, arranging them according to the places from which they have been obtained: we may derive therefrom some information which will not be without its use.

Cave at Le Moustier.

Aquila fulva	1 individual.	Alcyon ispida	1 individual.
Corvus monedula	1 „	Tetrao tetrix	1 „
Alauda arvensis	1 „		

The Gorge d'Enfer.

Vultur	1 individual.	Tetrao scoticus	1 individual.
Tetrao albus	1 „		

Cave at Les Eyzies.

Nyctea nivea	7 individuals.	Lagopus albus	15 individuals.
Pyrrhocorax alpinus	4 „	—— scoticus?	3 „
Lagopus mutus	3 „	Grus primigenia	1 or 2 individuals.

Station of La Madelaine.

Aquila fulva	1 individual.	Pyrrhocorax alpinus	14 individuals.
Falco communis	1 „	Nucifraga caryocatactes	1 individual.
—— tinnunculus	1 „	Pica caudata	1 „
Gypaëtus barbatus	1 „	Turdus viscivorus	10 individuals.
Vultur monachus	1 „	Tetrao urogallus	1 individual.
Corvus corax	2 individuals.	Perdix cinerea	1 „
—— corone	1 individual.	Œdicnemus crepitans	1 „

Cave of L'Eglise (St. Martin d'Excideuil, Dordogne).

Pyrrhocorax alpinus	1 individual.	Perdix cinerea	1 individual.
—— primigenius	1 „		

Station of Bruniquel (Tarn et Garonne).

Aquila fulva	1 individual.	Fringilla nivalis	1 individual.
Buteo vulgaris	1 „	Hirundo rupestris	1 „
Falco tinnunculus	1 „	Lagopus albus	3 individuals.
Gypaëtus barbatus	1 „	Tetrao urogallus	1 individual.
Strix flammea	1 „	Gallus	1 „
Noctua minor	1 „	Rallus aquaticus	1 „
Nyctea nivea	1 „	Anas boschas	2 individuals.
Corvus corax	1 „	Querquedula circia	1 individual.
Pyrrhocorax alpinus	1 „		

Cave at Lherm (Ariège).

Nyctea nivea	6 individuals.	Lagopus mutus	7 individuals.
Pyrrhocorax alpinus	2 „	—— albus	17 „
Ampelis garrulus	1 individual.	—— scoticus?	9 „
Ruticilla phœnicura	1 „	Gallus	1 individual.

Cave at Massat (Ariège).

Aquila clanga	1 individual.	Loxia curvirostra	1 individual.
Falco subbuteo	1 „	Lagopus mutus	1 „
Nyctea nivea	1 „	—— albus	2 individuals.
Pyrrhocorax primigenius	1 „	Tetrao tetrix	1 individual.
Nucifraga caryocatactes	1 „	Gallinula chloropus	1 „
Fringilla nivalis	1 „	Anas boschas	1 „

Cave at Gourdan (Haute Garonne).

Haliaëtus albicilla.
Aquila fulva.
Buteo vulgaris.
Falco tinnunculus.
—— subbuteo.
Vultur monachus.
Nyctea nivea.
Bubo maximus.
Corvus corax.
—— cornix.
Pica caudata.
Pyrrhocorax alpinus.
Coracia gracula.
Loxia chloris.
Gallus.
Lagopus mutus.
—— albus.
Grus primigenia.
Cygnus ferus.
Anas boschas.
Anas, sp.?

Cave at Lourdes (Hautes Pyrénées).

Corvus corone.
Pyrrhocorax alpinus.
Hirundo rupestris.
Tetrao lagopus.
—— albus.
Perdix cinerea.

Station of Aurignac.

Aquila clanga	1 individual.	Nyctea nivea	1 individual.
Buteo vulgaris	1 „	Corvus corax	2 individuals.
Milvus regalis	1 „	Columba livia	1 individual.
Vultur monachus?	2 individuals.	Tetrao albus	1 „

When the distribution of the species in the beds just enumerated is examined, the influence of Man is evident in some instances; it was he who brought thither the Birds which must have served for his food. Thus in the Cave at Les Eyzies we find almost only eatable species, such as the *Lagopodes* and *Grus primigenia*—which latter must have been much sought after at that period, not only on account of the delicacy of its flesh, but also because the bones, by reason of their length and solidity, supplied material for the fabrication of needles, arrow-points, and other similar implements. At La Madelaine, also, it was the leavings of the meals that brought about the accumulation of bird-bones; but, together with numerous *Tetraones* and Cocks, we find the remains of several Harfangs. Were these last eaten by Man? or did they inhabit the vicinity? I am inclined to prefer the latter hypothesis, because on not one bone have I found the marks of the flint implements which served for detaching the flesh. It seems, on the contrary, that the men of the Lherm Cave ate this Owl; nearly all the bones there bear the traces of stone knives: *Tetraones* abound also at Lherm, while other Birds are rare, or only represented by a small number of remains. At Le Moustier the presence of Birds seems to be accidental, as well as in the Caves of the Gorge d'Enfer. At Lacombe-Tayac, I should be disposed to believe that it was principally streams of water that carried in these remains; for there are but few bones of edible species there, while a great variety of Passeres are observed—numerous Choughs and several Rapaces, some of which have been determined by a single bone only.

The deposit at Bruniquel appears to have been formed under the same influences; and Man cannot have been the sole cause of the transport of the bones found there. At Massat edible birds do not seem to be more numerous than the other species, while at Gourdan we see them predominate.

XXIV.

NOTES ON OBJECTS OF STONE FROM THE CAVE OF LES EYZIES, VALLEY OF THE VÉZÈRE, PÉRIGORD. By Professor T. Rupert Jones, F.R.S., F.G.S.

A classified catalogue of the flint flakes and implements, and of other stone objects, found in each of the Caves on the Vézère would be very instructive, but cannot be compiled. Nor, indeed, can the contents of any one of the Caves be enumerated in detail. By enumerating, however, such specimens from one Cave as have been preserved in the Christy Collection, we may probably find an average and sufficiently characteristic assortment. We take, therefore, those preserved from the Cave of Les Eyzies*, grouping them as follows:—

I. *Pieces of rocks* foreign to the locality, and either washed down from the higher country by the river (see page 28, and the Map at page 29), and then picked up and introduced into the Cave; or brought from a distance by the Cave-folk themselves. In either case, probably they have been used for some purpose, evident or obscure (as Nos. 2, 8, 19, 20, 21, 22, 24, 28, 29, 30)—and sometimes engraved with recognizable outlines or marked with less intelligible scorings (as Nos. 3, 9, 13, 14, 17, 27). The use of the Iron-pyrites (No. 30) as a Strike-a-light, and of the Hæmatite (Nos. 28 and 29) for paint, is of much interest. Several of the articles having been figured, as noted in the List, their full descriptions will easily be found.

II. *Flint.*—Besides some few irregular fragments, and one roughly chipped hammer-like piece, we find 53 Cores, 436 Flakes (simple and dressed), and 155 "Scrapers" of Flint arranged in the Collection; but these necessarily constitute only a small portion of the whole quantity taken from the Cave. In enumerating the different kinds, we refer to the specimens from Les Eyzies figured in the Plates A; and the descriptions accompanying those figures will supply detailed information regarding them

There is one Knapping Stone†, if not two, in this series (Nos. 22 & 23); and four of the curious Mortar-stones (No. 20). There are five, also, of the latter

* See above, pages 5, 20, 36, 170, 182.

† A quartz pebble Knapper from Le Moustier, and one of granite from La Madelaine, may be mentioned.

from La Madelaine; but one of them is small, and may have been a Knapper. No Rubber-stone has been recognized at Les Eyzies, like either the one of clay-slate (A. Plate XXV. fig. 3), or a companion quartz pebble so used, at La Madelaine. The rough Lance-heads of Le Moustier and the highly dressed Javelin-points of Laugerie seem to be wanting. Among the Les-Eyzies specimens there are very few like the coarse Choppers of Le Moustier; and oblique triangular dressed flakes, such as are common in the latter Cave, are also rare (No. 6). These two kinds occur very rarely at La Madelaine also, and seem to be wanting at Laugerie and the Gorge d'Enfer. The little Side-scrapers (like No. 26) and Angle-scrapers (like No. 27), frequent at Les Eyzies, are abundant also at La Madelaine. So also ordinary flakes are generally abundant in the Caves; but at Le Moustier such simple flakes, especially of small size, are very rare. For remarks on the contents of these Caves and Rock-shelters, see above, pages 4 *et seq.* and pages 166 *et seq.*

In applying the terms "grey," "drab and cream-coloured," "brown," &c. to the different kinds of flint, we have been obliged to group the several tints of light and dark, as well as the mottled and granular appearances, together under these respective heads, though doubtless a careful recognition of the distinctive characters would be a good guide in investigating the local sources of the various flints used by the Aborigines. Indeed the study of the flint of the Vézère Valley would be of much interest. Its frequent granular condition has reference to the still visible organic particles, such as *Polyzoa*, constituting the original limestone; whilst other varieties of the flint show the Spicula of Sponges abounding here and there in the Chalk before it was pseudomorphosed into flint, as is often the case in England and Ireland. Frequently the flint is translucent and apparently homogeneous, owing to the perfect change the rock has undergone in its silicification. These differences are alluded to in the notes on specimens in the Descriptions of the Plates. See also remarks on Flint at pages 202–205.

Grey flint, of many tints and shades, is found in 468 of the specimens; drab and cream-coloured flint, sometimes almost yellow, rarely white, but often passing towards brownish-grey, in 91; various yellow flints, sometimes marked with dendrites, in 32; and several browns, honey-brown, grey-brown, &c., in 53. Yellow and cream-coloured specimens are most abundant among specimens from the Gorge d'Enfer; there are many from Laugerie, several from La Madelaine and from Les Eyzies; but from Le Moustier there are very few, if any. The "greys," both light and dark, mottled and granular, abound everywhere.

Specimens made of Chalcedony, from the insides of flint-nodules, are occasionally met with; but none of agate-chalcedony. Rock-crystal and vein-quartz occur in some few specimens and as occasional fragments (see above, Nos. 18 and 22, and page 175), but are rare.

A Classified List of Stones, Stone Flakes, Implements, &c. from the Cave at Les Eyzies.

I. VARIOUS ROCKS AND MINERALS.

1. A broken slab of Greenstone, smoothed on both sides and marked with parallel and crossing lines, probably by ice-action (river-ice).
2. A narrow, tongue-shaped, tapering piece of Greenstone, polished towards one end, smoothed and striated elsewhere.
3. A fragment of Greenstone, with a worn (ground?) flat surface marked with some obscure formal outlines.
4. A fragment of a subangular piece of brown dioritic (?) Schist, partly rounded and smooth.
5. A fragment of a subangular smooth block of chloritic Schist with quartz-vein.
6. Two fragments of greenish-grey hornblendic (?) Schist, from subangular smoothed blocks: one with striated surface; the other quite smooth.
7. Three fragments of dark-grey hornblendic (?) Schist.
8. Seven fragments of greenish-grey hornblendic (?) Schist; with one side worn flat and in some instances stained with hæmatite.
9. A small slab of greenish-grey hornblendic (?) Schist, with an outline of a Herbivore. A. Plate XXIX. fig. 1.
10. A piece of bluish-grey hornblendic (?) Schist, smoothed, and marked with parallel and cross lines, probably by the action of river-ice.
11. A piece of brownish-grey hornblendic (?) Schist, smoothed and marked with irregular lines by river-ice-action.
12. Flattish pebble of dark-green hornblendic (?) Schist, smooth and faintly striated.
13. A pebble of Schist, with the outline of a Fish (?). A. Plate XXIX. fig. 3.
14. A fragment of quartzose Schist, worn flat on one face, stained red, and bearing an obscure formal outline.
15. Two chips of hard black siliceous Schist.
16. Two flat fragments of Mica-schist, from smooth rounded blocks: one granular and soft; the other solid, with reddish felspar.
17. A small slab of Mica-schist, with the outline of the head of a Reindeer. A. Plate XXIX. fig. 5.
18. A fragment of Vein-quartz and a piece of decomposed Mica-schist in Hearth-stuff.
19. Eleven fragments of rounded blocks and subangular pebbles of reddish, finely laminated, hard, micaceous, Granitoid Rocks: some may have been used for fire-stones or boiling-stones.
20. Four hollowed, round stones, small and large; some much, others only slightly, hollowed: Granite, both solid and schistose. "Mortar-stones." A. Plate XIII.

21. One small hollowed pebble of yellow fine-grained Sandstone. A. Plate XXIII. fig. 1.
22. One quartz Knapping-stone.
23. A pebble of gneissic granite, with a slight hollow on one face; possibly a Knapping-stone.
24. Ten fragments of rounded blocks and pebbles of Quartz and Quartzites: some may have been used for hearth-stones or boiling-stones, some as knapping and hammer stones.
25. An irregularly flat flake of yellow fine-grained Quartzite, passing into the friable brownish-grey Sandstone of the outside. Some stalagmitic hearth-stuff adheres to the flake-face.
26. A piece of a four-sided, slightly tapering rod of fine-grained, brown, micaceous Sandstone, rounded at one end, broken at the other; $2\frac{1}{2}$ inches long, and about $\frac{1}{4}$ inch square.
27. A piece of brown quartzose Grit, with hæmatitic matrix; smoothed on one part.
28. A piece of red Sandstone.
29. A small pebble of Limestone, striped with transverse and oblique lines. A. Plate XXIX. fig. 2.
30. A fragment of Micaceous Iron-ore (spangly Hæmatite).
31. Six pieces of Hæmatite, mostly scraped.
32. A subcylindrical nodule of Iron-pyrites, $2\frac{1}{2}$ inches long, bruised on one end.

II. FLINT.

1. Miscellaneous.

1. Six irregularly chipped Flints.
2. An unused bayonet-shaped splinter. A. Plate II. fig. 8.
3. A grey Flint chipped into an irregularly oval Axe-hammer (?), with a rough cutting edge, which is crushed (used?) on one side.

2. Cores.

1. Six rough or slightly chipped Flints, from one end of which small flakes have been struck off.
2. Four "Mitre Cores," large and small; in which the removal of flakes has produced a cone or thick disk, oval or circular, with a sloping edge. A. Plate I. figs. 4 & 5.
3. Nineteen long Cores; some rather flat; some large. A. Plate I. fig. 7; Plate XIV. fig. 2.
4. Twenty-four short, partly rounded, sloping Cores ("Hoof Cores"). One made out of an old (Tertiary?) pebble. A. Plate I. fig. 2.

Cores, 53: grey, 40; yellow, 8; brown, 5.

3. Flakes.

1. Ten "Core-end Flakes," having a thick curved end which was part of the apex of the Core: not used.
2. Twenty-three large and small, straight and curved "Corner Flakes" or "Edge Flakes," struck off dressed blocks; not used.
3. Two large, coarse, curved, simple Flakes; not used.
4. Thirty-three rough, simple Flakes, various: more or less used (sometimes dressed) on edge or point. A. Plate VIII. fig. 3; Plate XXXI. fig. 11.

5. Nine short, wide, rough, unused Flakes; one thinner, larger, and rougher than the other. A. Plate XXXI. fig. 10.
6. One thick, short, triangular, bulbed Flake, trimmed straight on one edge to make a broad point. Like A. Plate XL. figs. 2, 3, and 5, from Le Moustier.
7. Fifty-eight simple Flakes, unused; fifty-five whole, three broken. A. Plate XV. fig. 1; Plate XXXI. figs. 3, 4, 6.
8. Fifty-five whole Flakes, large and small, bearing more or less evidence of having been used in cutting, scraping, or other work: one is a "Core-end Flake." A. Plate XVI. fig. 7.
9. Forty simple Flakes, large and small, more or less used and broken. A. Plate II. figs. 8, 14; Plate XV. figs. 1, 7, 10; Plate XXXI. fig. 7.
10. Nine fragments of small, thin and narrow Flakes.
11. Ten Flakes, worn on one or both edges: five with the slope of the scaling on the inner face of the flake; two with it on the outer face; and three having it alternate. A. Plate XXXI. fig. 1.
12. Fourteen Flakes, perfect or broken, used on edge or end, some much worn, and one *smoothed* by use on one edge. A. Plate XV. fig. 7; Plate XVIII. fig. 12.
13. Three Flakes used roughly and smoothed at each end. A. Plate XV. fig. 2.
14. Two broken Flakes, used at the point.
15. Ten whole Flakes, with marks of use or of dressing on one or both edges at the but-end. A. Plate XVI. fig. 10.
16. Thirteen Flakes (one broad, ten various, and two broken), used on one or both sides of the point.
17. Ten Flakes tanged, mostly at the bulb-end, and more or less used. A. Plate II. fig. 14; Plate VIII. figs. 5, 6, 7; Plate XVI. fig. 11.
18. Twenty-nine Flakes, of various sizes, tanged at the end opposite to the bulb-end; some used. A. Plate II. figs. 15, 24; Plate VIII. fig. 2.
19. Nine Flakes tanged at both ends, of various sizes, without distinct marks of use.
20. Eleven scimitar-shaped, pointed Flakes, somewhat like Share-bones*. A. Plate XVIII. figs. 1, 4, 5, 6, 7.
21. Five chisel-ended Flakes, both narrow and broad, with the end-edge either slightly convex, straight, or oblique. (Compare A. Plate XLII. fig. 5, from La Madelaine.)
22. Six crescent-ended Implements, or Flakes hollowed at the broad thin end.
23. Two broad-ended Flakes with two hollows and three points worn or chipped out of the terminal edge.
24. Twenty-seven flakes (two of them tanged), with a broad thin end worn or worked away obliquely and hollow, so that a lateral point remains, sometimes sharp, generally blunt. Angle-scrapers and Rimers. A. Plate XVIII. fig. 10.
25. Fifteen Flakes, some simple, some tanged, and some broken; worn or dressed at one end to a single point, and serviceable as piercers or rimers, side-scrapers, or double angle-scrapers: one short, chipped to a sagittate form, fig. 1 *a*, *b*, page 21.
26. Fourteen more or less dressed, blade-like Flakes, worn or chipped into a long deep notch on one side at one end (Knives, Side-scrapers, or Angle-scrapers; and Arrow-heads, if regarded with point upwards, which otherwise is supposed to have been inserted in a haft). Nine are worn on the left edge, the worn end being forwards and the ridge-face upwards; four, on the right edge; fragments of the sharp end, five. A. Plate XVIII. fig. 10.

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* See also the figures of similar specimens from the Duruthy Cave, Pyrenees, in MM. Lartet & Dupare's Memoir on "Une Sépulture des anciens Troglodytes &c.," 1874, 8vo, Paris, p. 49, pl. 19 (40). figs. 7, 9.

27. Fourteen small, straight, narrow Flakes, or Side-scrapers, used or chipped along one edge as far back as the ridge; some broken. (Like A. Plate II. figs. 9, 10; and Plate XLI. fig. 18.)
28. One small narrow Flake with five semicircular notches on one edge. A. Plate XLI. fig. 5.
29. One small, narrow, double-pointed Flake, shuttle-shaped by chipping along the edges, with the scaling on the ridge-face. Like A. Plate VIII. fig. 4, from Laugeric Haute, but smaller.

Flakes, 436: grey, 328; drab, cream-coloured, and white (rare), 56; brown, 40; purple, 2; red, 10.
——, simple: not used, nor dressed, 111; either used, or dressed, or both, 181.
——, tanged: at one end, 39; at both ends, 9: mostly used.
——, scimitar-shaped, 11.
——, chisel-ended, 5.
——, hollow-ended, 8.
——, pointed by one lateral notch, 27.
——, pointed by two lateral notches, 15.
——, dressed sharp at one end and broadly notched on one side at the other, 14.
——, dressed or used throughout one edge, 14.
——, notched along one edge, 1.
——, dressed to shuttle-shape, 1.

4. Splinters.

Twelve Splinters from the edges of worked and used Implements; triangular in section, crooked, and bayonet-like. The chips of "tanging." Compare A. Plate XLI. fig. 10, from La Madelaine.

Splinters from edges of dressed or used Implements, 12.

5. "Scrapers," or "Thumb-flints."

1. Eight large and small one-ended "Thumb-flints" or "Scrapers," made out of Core-end Flakes.
2. Thirteen Scraper-ended Flakes (slightly rounded at one end).
3. A Flake roughly rounded at one end and notched on one-side close by; broken.
4. Nine Flakes rounded at one end, and squared, partly pointed, or irregularly shaped at the other: one, short, rounded at one end, and roughly squared at the other, is stained with hæmatite. A. Plate XXIV. figs. 5, 9.
5. Fifteen Flakes, long and short, rounded at one end, more or less pointed, rough, bruised, or *smoothed* at the other; and three similar but imperfect by loss of the rounded end.
6. Three Flakes rounded at the bulb-end. A. Plate XXXIV. fig. 9.
7. Eleven Flakes rounded at the end opposite to the bulb: five short, rough, A. Plate XXIV. figs. 2, 5, 9; six of the ordinary form, straight and parallel-sided, A. Plate XXIV. fig. 10, Plate XXXIV. figs. 2, 10; and one with oblique end, A. Plate XLII. fig. 4.
8. Twenty spatulate Scrapers, varying in length; two broken. A. Plate VII. fig. 13.
9. Twenty-two tanged Scrapers; two broad and subrhomboidal, A. Plate VII. fig. 8; the others varying in breadth, A. Plate VII. figs. 7, 9, 11; two broken.
10. Five tanged Implements like the Scrapers, but broken, wanting the rounded end: one angular at the broad end, A. Plate VIII. fig. 7.

11. Fifteen imperfect Scrapers, one end having been broken off: five not much shortened; ten much shortened: one of these latter has a part of the rounded edge *smoothed* by use; another has had its side-edges used and is stained with hæmatite.
12. Eight Scrapers, various, some tanged, some irregular in shape, some broken.
13. Fifteen double Scrapers (Flakes rounded at both ends), long and short, one of the latter much *smoothed* on one of the terminal edges. A. Plate XXIV. figs. 13, 14; Plate XXXIV. fig. 7.
14. Six double Scrapers, damaged at one end. A. Plate XXXIV. fig. 2.
15. An irregular double Scraper; short, and roughly rounded at the ends.
16. Three rounded or circular Scrapers. A. Plate XXXVII. fig. 5.

"*Scrapers*," 155: grey, 100; drab and cream-coloured, 35; yellow, 11; brown, 8; purple, 1.
Rounded at one end: not tanged, often used at the narrow end, 100; tanged, 30.
Rounded at both ends, 22.
Circular, 3.

Fig. 87.

A Core-end Flake (half purple, and half yellowish-grey), dressed as a Scraper, from La Madelaine.

a, Ridge-face. *b*, Edge. *c*, Flake-face.

XXV.

FOSSIL MAN FROM LA MADELAINE AND LAUGERIE BASSE.

By M. E. T. Hamy, M.D., Assistant-Naturalist in the Museum of Natural History, Assistant-General-Secretary of the Anthropological Society of Paris, Member of the Anthropological Societies of London, Florence, and Moscow.

[C. Plate IX. & X., double.]

Human Palæontology has had the rare good fortune to base its first descriptions on the examination of osseous remains presenting extremely pronounced anatomical peculiarities. The Neanderthal Man gave rise to numerous publications, in which the more salient features of his special morphology were in turn pointed out; and anthropologists have been able to group around this typical description those of less striking examples belonging to the same ethnic division. In the same way, for the great dolichocephalic race of the South of France the skeletons from Cro-Magnon, and especially that of the "Old Man," have furnished characteristics which have been again found, more or less attenuated, in the other Stations of the Reindeer Period in the same or adjacent Provinces. The human bones from La Madelaine, Laugerie Basse, Bruniquel, &c. have recently been successively compared with those from the Rock-shelter of Cro-Magnon; and, thanks to the exaggerated ethnic characters of the latter, a number of peculiarities of a secondary order, which at first had escaped notice, have been recognized and appreciated. We have been able, up to a certain point, to classify the characters, the degree of fixity of which has been brought out by all these comparisons; consequently to determine which are the constant features of the race, and which are individual variations, and the amount of the latter; and finally, with the aid of these determinations, to commence the study of the extension of this ethnic group in space and time.

It is scarcely necessary to remark that, as these comparative studies are founded on the examination of only a very few bones, up to the present, the conclusions which may be drawn from them cannot be presented as absolutely definitive. Such as they are, however, these researches may be usefully put forth in this work; and we will give a rapid survey of them, limited to the centre of operations of the lamented Authors, in accordance with the spirit which presides over the publication of the materials that are to complete it.

I.

In the preceding Parts of this work* detailed descriptions have been given of the anatomical conformation of the Cro-Magnon individuals. The recent "finds" at Laugerie Basse, and the older one at La Madelaine, which we are now about to describe, supply reduced forms of what was excessive in the Troglodytic family discovered by M. L. Lartet: some characters, to which our colleagues attached exaggerated importance, lose a little of their value; several features, reputed constant because found in all the subjects from the Burial-place of Les Eyzies, do not possess the fixity which was attributed to them; the individual variations appear greater; but, on the whole, the ethnical characteristics subsist nearly as presented by MM. Broca and Pruner-Bey. The whole of the facts obtained, however, give now the notion of a mean which must be very closely approximate, and which will be but little modified by fresh discoveries, at least in the Valley of the Vézère.

The number of subjects exhumed at Laugerie Basse by the able and persevering archæologist Elie Massénat is four. Lartet and Christy found at La Madelaine the remains of a fifth individual. We will study these five fossils *seriatim*, commencing with that which has become celebrated under the name of "the crushed Man" from Laugerie, and bears the "No. 4" in M. Elie Massénat's collection.

Skeleton from Laugerie Basse ("No. 4").—M. de Mortillet† communicated the discovery of this skeleton briefly to the Anthropological Society of Paris, on the 4th of April, 1872; and M. Cartailhac gave a detailed description of it in a memoir presented to the Natural-History Society of Toulouse in the course of the same month‡. From the information gathered by these two archæologists, as well as from that which the principal author of the discovery himself forwarded to us, the Skeleton lay at a depth of 4 mètres, in ground formed of ancient hearths, strewed with large blocks of fallen rock from the escarpment which overhangs the Quaternary Station of Laugerie Basse.

The annexed figure will make intelligible the relations of the skeleton to the deposits of the Reindeer Period which surround and overly it. Beneath and

* Pruner-Bey, An Account of the Human Bones found in the Cave of Cro-Magnon; P. Broca, On the Human Skulls and Bones found in the Cave of Cro-Magnon, near Les Eyzies: *suprà*, pp. 73–92, and 97–122.

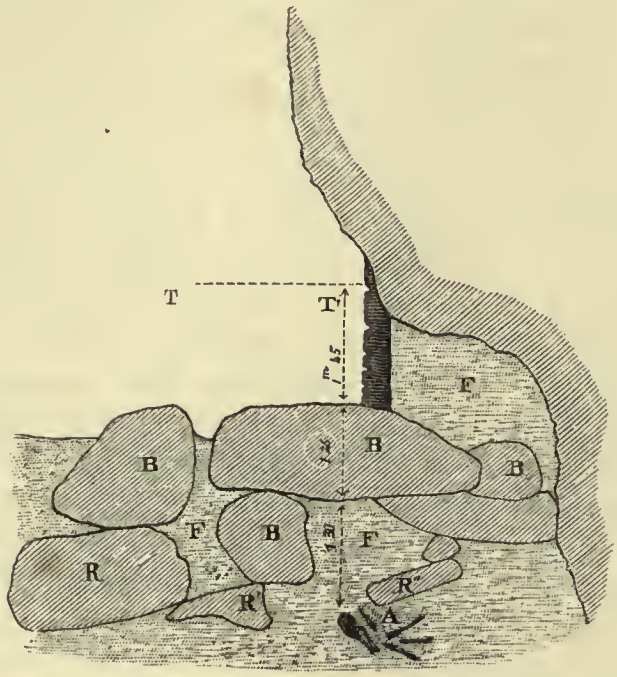
† "Les hommes des cavernes à l'époque de la Madelaine," Bull. Soc. d'Anthrop. de Paris, 2e série, vol. vii. p. 489, 1872; Matériaux pour l'Hist. de l'Homme, sér. 2, vol. vii. p. 232.

‡ 'Un Squelette humain de l'âge du Renne à Laugerie Basse (Dordogne),' 8vo, from the 'Bull. de la Soc. d'Hist. Nat. de Toulouse,' 1872, pp. 18, 19. See also 'Matériaux' &c. sér. 2, vol. vii. p. 224, pl. 9.

behind a recent structure used as a sheepfold, in the construction of which some ancient deposits, 1·45 mètre (4 ft. 8½ in.) thick, which are still seen filling the entire depth of the Shelter, have in part disappeared, a layer, 1·25 mètre (4 ft. 1 in.) in thickness, principally of large fallen stones (B B), was met with, among which were continued, more or less dislocated, the hearths F F, with chipped flints and worked bones from the superficial bed. In order to get

Fig. 88.

Section of the Rock-Shelter at Laugerie Basse, showing the Human Skeleton "No. 4" of the Massénat Collection, *in situ*.



A, The skeleton.
B B, Blocks of fallen rock.
R R′ R″, Lower rocks, beneath which the gallery was excavated.

F F, Palæolithic hearths.
T T′, Ancient level of the talus, cut down in order to make a sheepfold.

beneath these blocks (some of which are 9 mètres in length, 2 in breadth, and 2 in thickness), M. Massénat and his collaborators excavated a gallery under the rocks R R′ R″ of our section, and in doing so brought to light a new layer of hearths of 1·2 mètre (3 ft. 11¼ in.) thickness, abounding in archæological and palæontological remains of all sorts, and but little deranged by the fall of the rocks which rested on them. The skeleton was at A, its skull to the north-east,

towards the Vézère, the feet to the south-west, towards the further end of the Shelter. It lay on its left side, in a crouching posture, the left hand upon the corresponding parietal, the right on the neck, the elbows towards the knees, one of the feet somewhat drawn up towards the pelvis. To M. Cartailhac it represented an individual overtaken by a fall of earth, and bending himself together in order to escape death. The vertebral column was crushed under the edge of a large block of stone, the pelvis dashed to pieces; but some of the limb-bones were nearly intact, and the skull in a favourable condition for a tolerably detailed description.

Among the limb-bones accessible to examination, the most remarkable are the right humerus and fibula, which M. Massénat was able to disengage uninjured from the block in which the skeleton is enclosed. Still these two bones are imperfect, the humerus wanting a portion of its head, and the fibula having lost its upper extremity. It is easy to restore the parts that are wanting, by comparing these with the similar bones found at Cro-Magnon, especially those of the "Old Man." The humerus, in its present state, is 309 millims. (12 inches) in length; comparison shows that about 30 millims. (1·18 inch) must be added to this to give its total length: thus completed, it measures 335 millims. (12·19 inches); that is to say, it equals, or falls very little short of the mean length of those from Cro-Magnon*, which allows us to suppose that our subject must have been not far from the height (1·8 mètre =5 ft. 11 in.) assigned to the men of the Rock-Shelter discovered by M. Louis Lartet. It repeats, moreover, all the other exceptional characters of the humeri found in that Station. The shaft (diaphysis) is long and stout, somewhat compressed laterally, with a thick and rugose posterior border, enormous deltoid-muscular impressions, a short but well-defined groove of torsion. The inferior extremity is remarkable for its width (66 millims. or 2·6 inches), the prominence of its epitrochlea (exceeding 1 centim. =0·39 inch), and the dimensions in all directions of its articular surfaces. This inferior extremity, flattened antero-posteriorly, is a little incurved forwards, the curvature commencing at the junction of the middle and inferior thirds. The olecranian and sigmoid cavities are separated by a relatively thick partition†.

The much more striking anatomical characters described in the fibulæ from Cro-Magnon are found with extremely remarkable exaggerations (C. Plate IX. & X. fig. 12) in the fibula of "No. 4" from Laugerie Basse. The length of the fragment exceeds 34 centims. (13·4 inches); and to this about 4½ centims. (1·8 inch)

* Explanation of C. Plate VI., p. 91.

† *Vide suprà*, p. 84.

should, apparently, be added, which would make its total length nearly 39 centims. (15·3 in.), nearly equal to that assigned by M. Pruner-Bey to the fibula of the Old Man of Cro-Magnon (C. Plate VI. fig. 4)*.

M. Broca, in describing this latter, mentions particularly the depth of its longitudinal sulci, and the prominence of the crest for the ligamentum interosseum—conditions essentially influenced by muscular actions. In our subject the former has received an astonishing development. The external face of the bone, which gives attachment to the lateral peronæi, is at the same time widened and sunk to such a degree that the sulcus which furrows it, and which even on "No. 1" from Cro-Magnon had the very unusual depth of 5 millims. (0·2 inch), penetrates here to a maximum of 8 millims. (0·3 inch) within the plane that unites the external and anterior angles. The groove for the flexor hallucis longus is also very strongly pronounced, as well as the rugosities for the inferior fibres of that muscle. The linea interossea is salient and convex. The body of the bone, relatively stout, is remarkable for its total outward and slightly hindward curvature—a curvature, like that of the humerus described above, not to be confounded with those resulting from rachitis, which are very different. In fine, the lower extremity is enormous, and all its details extremely pronounced.

We shall find again in the anatomy of the Skull of the Man of Laugerie the analogies which strike us in studying his long bones. Indeed, in almost all the portions which remain intact, it reproduces the traits belonging to the male crania from the Shelter of Cro-Magnon. In its cephalic curves it assimilates particularly to the cranium "No. 3," described at page 78, to which it is little inferior in dimensions. Its antero-posterior diameter not exceeding 195 millims. (7·68 inches), and its transverse diameter reaching 146 millims. (5·75 inches), the diminution affects simultaneously and in nearly equal proportion all the bones of the cranial arch: the frontal, equal to that of the cranium "No. 3" from Cro-Magnon in the dimensions of its base (diam. front. min. 97 millims. or 3·8 inches; biorb. ext. 111 millims. or 4·37 inches; biorb. int. 101 millims. or 3·98 inches), is a little shorter (length 135 millims. or 5·32 inches) and narrower in its maximum width (118 (?) millims. or 4·65 inches). It has besides almost completely the morphology of the crania with which we compare it, resembling a little more closely "No. 1" of the same Shelter by the existence of a small median arching commencing immediately above the glabella.

The parietal (the length of which it is difficult to estimate, on account of the many fractures it has suffered) appears to measure 125 millims. (4·9 inches) along

* See p. 83.

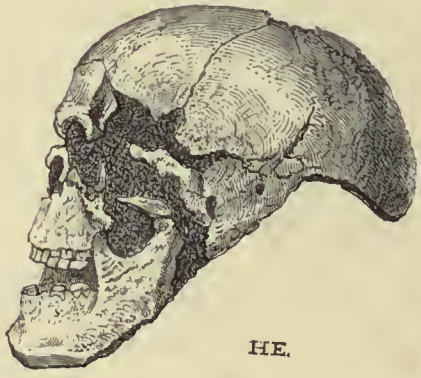
the curve, consequently 7 millims. (0·276 inch) less than that of the cranium with which we are particularly comparing it.

Of the occipital the superior angle only is preserved. In the cast which we have before us the angle of the lambdoidal suture appears to be occupied by a small Wormian bone. If this exists in the original, it constitutes a further point of resemblance to the crania from Cro-Magnon, of which two out of three have these supernumerary bones behind. We have elsewhere expressed our opinion on the signification of these anomalies*; we revert to it here merely to insist upon their relative frequency in the Cave-people of the Vézère, whose cranial synostosis usually follows Gratiolet's law, of which our law of inverse anomalies is, in truth, only a corollary.

The sutures of the cranium of the crushed Man of Laugerie appear to be open, and seem to us tolerably simple. Comparison of them with those in the skulls from the Shelter of Cro-Magnon leads us to believe that he was not adult; we know, in fact, that in the adult "No. 3" the obliteration of the sutures was already far advanced, and that "No. 4," in which the "wisdom-tooth" had not yet emerged, already presented points of effacement of the coronal and sagittal sutures. Nevertheless the teeth of the latter individual were considerably worn; and we shall see

Fig. 89.

Cranium from Laugerie Basse, "No. 4." Profile, one fourth natural size. (*Copied, by permission of the publishers, MM. Baillière et fils, from the 'Crania Ethnica,' par MM. de Quatrefages et Hamy.*)



that the Man of Laugerie Basse is also remarkable for his greatly impaired dentition. Beneath a face deformed by vertical crushing (fig. 89), and from which no anatomical description can be drawn, an incomplete dental arc appears,

* "Recherches sur les fontanelles anomales du crâne humain," Journal de l'Anatomie et de la Physiologie de M. Ch. Robin, Nov. 1870–71, pp. 599, 600. *Cf.* 'Crania Ethnica,' p. 47.

in which are set three incisors, two canines, two premolars, and a molar, more or less deeply worn away, and reduced, by that rather uneven wear, to lengths varying from $8\frac{1}{2}$ millims. ($\frac{1}{3}$ inch) for the molars to $7\frac{1}{2}$ millims. (0·29 inch) for the incisors.

We have said that the examination of the face furnishes little useful information. One can only ascertain the inclination of the upper border of the orbit, the middling breadth and great prominence of the nose, of which only fragments remain, and the existence of a sharp edge in front of the nasal floor. The spina nasalis anterior, quite broken, seen in the middle of that edge, is short; the intermaxillary, which it surmounts, is not high, is but little prognathous, and is relatively depressed at the place of insertion of the myrtiform muscles. The alveolus of the canine tooth, which externally circumscribes this depression, is salient and thick; and the tooth which it lodges has a deep root, making its total length 23 millimètres (0·9 inch).

The lower maxillary is enormous; its horizontal ramus, extremely robust, and of unknown thickness (imbedded as it is in a matrix from which it has not been extracted), has nearly the height of "No. 1" from Cro-Magnon. There is still less difference between the vertical dimensions of the symphysis (36 millims. or 1·4 inch) and of the molar region (34 millims. or 1·34 inch). The outer surface has almost as much motion; but the mental fossæ are shallower; the chin is less massive and less pointed, although the alveolo-mental angle rises from 64° to 65°. The wear of the teeth is still more considerable than in the upper jaw: of the molars a height of only 7 millims. (0·276 inch) above the alveolar border is left, and only 4 millims. (0·157 inch) of the incisors.

The ascending ramus, high and broad, has its postero-inferior angle broken; so that its transverse (41–42 millims. or 1·61–1·65 inch) cannot be compared with its oblique diameter, which must have been rather less. The angle formed by the two rami is nearly the same as that of the mandible "No. 1" from Cro-Magnon, as it fluctuates between 108° and 110°. The coronoid process is thick, flat, and relatively short. The condyloid process and its neck are, unfortunately, still imbedded in the matrix, which conceals their forms.

II.

The bones which we have now described were not the first discovered at the Station of Laugerie Basse. As early as 1869 M. Elie Massénat, in a brief notice inserted in the 'Matériaux pour l'Histoire Primitive,' proved the finding of a

quantity of bones—humeri, femurs, tibias, maxillaries, &c.,—and a great number of incisor and molar teeth*. The long bones, although "perfectly preserved and without the slightest scratch or notch," appeared to their discoverer to have been perhaps associated with some scene of cannibalism. If we observe that certain existing savages, and the Esquimaux in particular, have so little respect for the remains of their kind, removed by various circumstances from their burial-places, that they allow them to be dragged round their huts with the osseous remains of the animals they have eaten†, we shall readily account for these accumulations of human bones in the hearths of Laugerie Basse, whither many causes might bring them after inhumation, of which if proof were needed, it would be furnished by the Shelter of La Madelaine and, perhaps, that which covered "No. 4" just described.

Whether devoured by their kind, or snatched from sepulture by some cause or other, the Men found at the commencement of 1869 at Laugerie Basse have not been anatomically described. We know only that a humerus a little shorter than that of "No. 4" reached 32 centims. (12·6 inches), and that caries is very rarely met with in the numerous teeth discovered by M. Massénat.

A generous communication from that intelligent and conscientious observer enables us to add to this rather vague information the description of three crania, collected under conditions comparable with those of the skeleton described above.

Cranium "No. 1" from Laugerie Basse.—This male cranium is, unfortunately, reduced to its posterior half; but it repeats, in a remarkable manner, in the parietal, temporal, and occipital regions, the characters of the "Old Man" of Cro-Magnon, of which it is a copy with reduced dimensions, especially crosswise. The characters of the parietal and temporal bones can be completely studied on the right side, where these bones are almost entire. The parietal curve and protuberances, the curved temporal line, and the sagittal suture recall exactly what was said of the same region in the male crania from Cro-Magnon. The bone is merely a little shorter (130 millims. or 5 inches, measured along the curve), and its posterior flattening is a little less pronounced; the curved line is well marked, but not exaggerated; and the suture is obliterated at the junction of the anterior with the middle third of the sagittal. The squamous portion of the temporal is broken along its margin; and consequently we do not know its

* "Objets gravés et sculptés de Laugerie Basse (Dordogne)," Mat. pour l'Hist. prim. et nat. de l'Homme, sér. 2, vol. i. 1869, p. 356.

† See Parry's Voyage and Lyon's Journal cited by Sir J. Lubbock, 'Prehistoric Times,' p. 395.

form; but its mastoid process, projecting a little outward, is but little inferior in strength and length to that of the "Old Man" of Cro-Magnon; only the posterior root of the zygoma is separated from it by a shallower and less distinct depression. This root is itself almost obliterated, especially above the auditory foramen, where it is scarcely apparent. Finally, what is seen of the zygoma stands out prominently.

The occipital, of which only the squamous portion remains nearly intact, shows at its superior angle no anomaly of ossification. But it affects a curve similar to that of "No. 1" from Cro-Magnon, and nearly of the same length—superior occipital curve 68 millims. (2·68 inches), inferior 56 millims. (2·2 inches). Its width is a little greater than that of the cranium which serves as a term of comparison; and it bears on its surface a remarkable grouping of muscular lines, such as is seen in C. Plate II. fig. 2. It has no distinct occipital protuberance.

Cranium "No. 2" from Laugerie Basse.—The female cranium numbered "2" in the Massénat Collection consists of a cranial arch comprising the frontal and parietals nearly complete and the almost entire squamous portion of the occipital. It closely resembles the cranium of the same sex found at Cro-Magnon, from which it differs a little by its somewhat smaller dimensions. An exact account of the extent of this reduction will be obtained by comparing the numbers which we have arranged in the Table accompanying this Memoir.

There is nothing remarkable in its morphology which we have not already indicated in the preceding descriptions; only those ethnic characters manifest themselves with the attenuations proper to the sex, attenuations which are generally the more considerable the nearer the race is to the savage state.

Above the scarcely visible superciliary arcs the forehead rises vertically as far as the level of the well-marked lateral protuberances, as often happens in the female. The middle frontal protuberance is continued by a sort of rudimentary vaulting, prolonged to the vicinity of the sagittal suture. The parietal protuberances are less salient and less dilated than in the male crania. The posterior and inferior flattening is but little visible, the occipital presenting only a slight rising behind. The occipital protuberance is but little marked; the curves are gentle; and the cerebellar plane is directed, as in the male crania, very obliquely forward.

Cranium "No. 3" from Laugerie Basse.—By the side of the Norma verticalis of the female cranium just described we have drawn (p. 264), in geometrical pro-

jection, that of a cranium of the same sex, distinguished as "No. 3" in M. Massénat's Collection. M. Broca, who has spoken of this cranium in a recent commu-

Figs. 90 *and* 91.

(*Copied, by permission of the publishers, MM. Baillière et fils, from the 'Crania Ethnica,' par MM. de Quatrefages et Hamy.*)

Fig. 90. Norma verticalis of Cranium "No. 2" from Laugerie Basse. (Half natural size.)

Fig. 91. Norma verticalis of Cranium "No. 3" from Laugerie Basse. (Half natural size.)

nication to the Anthropological Society of Paris*, believed, from the study of an inadequate cast, that it had belonged to a woman "certainly very aged." He saw no sutures apparent; and as the cranium was very small, especially in front, and its volume did not appear to much exceed 1100 cubic centims. (67 cubic inches), he presented it as "a hitherto unique exception" among dolichocephalic crania of this type, which have, on the average, a greater volume than those of our existing races.

The quite unexpected exception noted by our learned master and friend has not been confirmed. We have obtained from M. Massénat another cast of this skull,

* P. Broca, "Sur trois crânes de l'époque du Renne, découverts par M. Elie Massénat à Laugerie-Basse," Bull. Soc. d'Anthrop. de Paris, 2e série, vol. viii. p. 217 (1873).

in which all the sutures are apparent, and the right cheek-bone still adhères to the frontal. The characters of this portion of the face, as well as those of the entire cranial arch, are incontestably infantile. This skull, therefore, does not possess the value at first assigned to it. Its juvenility masks even the ethnic characters to a great extent. All that we can say of it is that it is plainly dolichocephalous: its antero-posterior diameter equals 172 millims. (6·77 inches); its maximum transverse diameter reaches 126 millims. (4·96 inches); and its cephalic index is 73·25. It will be observed that it has a large Wormian bone above the lambdoidal suture.

III.

Individuals of the race of which the skeletons from Cro-Magnon represent the most marked osteological type are met with, in the fossil state, in a considerable number of localities, widely distant from one another: but the principal centre is still the South of France; and among our southern valleys, that of the Vézère appears, up to the present, to have been the most frequented during the whole of the transition period which unites the age of the Extinct with that of the Retreating Animals.

Indeed we find again at La Madelaine as at Laugerie, towards the end of that period, the same type as at Cro-Magnon—which it is agreed to consider contemporaneous with "Lower Aurignac," and consequently much more ancient.

Lartet and Christy, as early as 1864, noticed the presence of Man in the fauna of La Madelaine*. "In the midst of this deposit," they wrote, "and at a certain depth, a fragment of a human skull, a half of a jaw-bone, and several long bones of a tall subject have been found. These human remains were covered by the same medley of bones of animals and chipped flints of which this bed is uniformly constituted throughout." Their state of preservation was identical with that of the bones of Reindeer and other mammals. Not finding, however, what they regarded as the result of inhumation in the very place which had served for the meals of the Reindeer-hunters, and, on the other hand, not perceiving around the human bones the usual accessories of sepulture of primordial times, the two authors showed extreme reserve as to the date of the skeleton of La Madelaine whilst this remained an isolated discovery.

* Ed. Lartet et H. Christy, "Sur des figures d'animaux gravées ou sculptées et autres produits d'art et d'industrie rapportables aux temps primordiaux de la période humaine," Revue Archéologique, April 1864; and 'L'homme fossile en France' (Paris: J. B. Baillière. 1864, 8vo), p. 135 *et seq.*

The observations collected at Lafaye (Bruniquel), at Cro-Magnon, and especially the state of things at Laugerie Basse, so similar to that of La Madelaine, soon showed that the Cave-dwellers late in the Quaternary period had willingly buried their dead in the places they inhabited; and Lartet, enlightened as to the true signification of discoveries of this nature by reading Parry, Lyon, &c., no longer hesitated to admit the genuineness of a piece of evidence which his rare good faith and scrupulous accuracy had at first induced him to contest. In his Table of the faunas of the Vézère, the genus *Homo* appears at the head of the genera of Mammalia exhumed at La Madelaine*.

As we have seen above, the skeleton of La Madelaine consists of the greater part of a frontal bone, the half of a left lower maxillary, and a number of more or less entire bones of the trunk and extremities.

Figs. 92 *and* 93.

(*Copied, by permission of the publishers, MM. Baillière et fils, from the 'Crania Ethnica,' par MM. de Quatrefages et Hamy.*)

Fig. 92. Frontal Bone from La Madelaine, side view. (Half natural size.)

Fig. 93. The same, front view. (Half natural size.)

The frontal, figs. 92 and 93, and C. Plate IX. fig. 1 *a*, very much resembles that of "No. 4" from Laugerie Basse, above described (p. 261), of which it has the superciliary arches, the subglabellar depressions, the inclination of the orbital margin, &c. It is merely narrower—its minimum diameter scarcely exceeding 9 centims. (3·5 in.), its external biorbital diameter being 107 millims. (4·2 in.); and the only peculiarity it presents is a certain coarseness of the osseous tissue, which is dense, relatively thick (7 millims. or 0·276 inch), and riddled, especially in the superciliary region, with numerous little vascular foramina. A short articular denticulation at the

* Vide *suprà*, p. 181.

moderately close transversal sinuosities shows, between the two supercilia, the last vestiges of the medio-frontal suture. The suborbital cavities are very large, two in number on the right side, represented on the left by a wide and relatively deep groove. What remains of the nasal bones indicates a thin and prominent nose. The interorbital space is only 25 millims. (0·98 inch); and the width of the bones proper reaches only 8 millims. (0·315 inch). The upper region of the face (of which alone we knew any thing) gives nearly the same relative proportions as the same part in the crania from Cro-Magnon, Laugerie Basse, &c.; that is to say, the median portion takes but little part in the transverse dilatation which is remarked in them.

The mandible, like the frontal, resembles the other similar pieces from the valley of the Vézère; it reproduces their forms with a somewhat less injured appearance. So far as can be judged from the fragmentary state in which it was found

Figs. 94 *and* 95.

(*Copied, by permission of the publishers, MM. Baillière et fils, from the 'Crania Ethnica,' par MM. de Quatrefages et Hamy.*)

Fig. 94. Inferior Maxillary from La Madelaine. (Seen from above.)

Fig. 95. Inferior Maxillary from La Naulette. (Seen from above.)

(fig. 94, and C. Plate IX. fig. 3), the rami diverge considerably; what remains of the chin gives it angular outlines, repeating on a smaller scale those of the chin

of "No. 1" from Cro-Magnon. The description of the horizontal rami, as well as of the teeth which they bear, would be very similar to those above given by Pruner-Bey, Broca, and ourselves. The muscular impressions are very distinct. The solidity of the teeth, the thickness of the enamel (nearly 2 millims.), their relatively small size, &c. have already been given in this work. The first molar, 11·5 millims. long, is still stouter than the second, the length of which is 10·5 millims.; it has five tubercles, while the latter has but four. The wisdom-tooth is small, fixed by two double roots; the revolving wear, proceeding from behind forwards and from within outwards, modifies the masticating surfaces along an almost regular helicoidal curve which strongly reminds us of that in "No. 4" from Cro-Magnon, &c. One character (on which, besides, we are not sufficiently enlightened) deserves a more attentive examination; we mean the obliquity of the socket of the second premolar. In the celebrated mandible represented by fig. 95 (after the engraving published by M. Dupont *) this alveolus is directed obliquely outward and backward. The Clichy mandible (the description of which will be found in the First Part of the 'Crania Ethnica,' now publishing, by myself and M. de Quatrefages) presents the same disposition. In that from La Madelaine, on the contrary, the alveolus of the second premolar is oblique outwards and forwards. We shall finish the description of the La-Madelaine maxillary by observing that the horizontal ramus is but little inferior in thickness to that of "No. 3" from Cro-Magnon, that its ascending ramus, surmounted by a feeble condyle with a very short neck, 42 millims. (1·65 inch) wide, is joined to the horizontal ramus at an angle of 111°, and, lastly, that the posterior angle is rounded and turned outwards.

The only bony fragments of the trunk which we have been able to recognize consist of the centrum of a cervical vertebra, the same part of a lumbar vertebra, a fragment of a large and stout rib, and a portion of the right ilium. The first two are void of interest, their state of mutilation not permitting the study of their apophyses. The iliac bone is a very good reproduction of the corresponding part of the same bone in the skeleton from Cro-Magnon as we have represented it in Plate IX. & X. fig. 6, *a* & *b*.

Of the left upper limb there remain the superior half of the humeral shaft, and a small fragment of the shaft of the ulna; and of the right arm-bones the lower half of the humerus, and the superior epiphyses of the radius and ulna, completing the articulation of the elbow. The humerus is remarkable for an antero-posterior

* 'L'Homme pendant les Ages de la Pierre dans les Environs de Dinant-sur-Meuse,' &c., 2 Edit., 1872 (8vo, Brussels), p. 100, figs. 10, 11.

curvature similar to that in the Laugerie-Basse subject above described, of which it reproduces the other characters on a slightly smaller scale. Its maximum inferior breadth is 62 millims. (2·34 inches).

The ulna is broken at too short a distance from its superior articulation for its curvature to be studied as in that from Cro-Magnon, of which, however, fig. 9 of C. Plate IX. & X. gives a very exact idea. We find in this mutilated extremity a character noticed by Dr. Broca in describing the Cro-Magnon bones—the shallowness of the sigmoid notch*. But as the olecranon and coronoid process do not exceed the ordinary dimensions, the contrast remarked by Dr. Broca between the small extent of the sigmoid notch and the size of the eminences which surround it has no longer any thing characteristic. The upper extremity of the radius, too, offers nothing remarkable.

The right femur, in a perfect state of preservation, and of which we give the front and side views, reproduces, in feebler form, all the special characters dwelt on by the authors of the anatomical descriptions in the earlier part of this work†. Its length is 46 centims. (18 inches),—and corresponds to a stature of 1·7 mètre (5 ft. 6·9 in.), consequently 14 centims. (5·5 inches) less than that of the tall Old Man of Cro-Magnon, and nearly equal to that of the femur "No. 2" from the same burial-place, of which it moreover repeats the characters as they are preserved in the fragments belonging to that skeleton. A piece of the shaft of the left femur belonging to this individual measures 26 millims. (1·024 in.) in minimum breadth, and 31 millims. (1·22 in.) in thickness at the same level; the femur from La Madelaine has a breadth of 27 millims. (1·06 in.), and a thickness of 31 millims. (1·22 in.). This latter dimension is slightly greater than the former, instead of being, as is usually the case, equal to it; but the differences are less pronounced than in the two men of Cro-Magnon, whose femurs measure 27, 30, and 31 millims. (1·06, 1·18, and 1·22 in.), and 32, 37, and 39 millims. (1·26, 1·42, and 1·54 in.) in thickness. The anatomists who described these bones remarked that those extraordinary thicknesses result from the considerable development of the *linea aspera*, the crest of which is extremely prominent.

The same character, weakened, is found again in the femur from La Madelaine. The section represented in fig. 10 *c* of our Plate shows that the *linea aspera* is developed on this bone, as on those of the other Cave-dwellers of the same valley, in the form of a small strengthening column applied to the shaft. The profile (fig. 10 *b*), which compared with the front view (fig. 10 *a*) permits an accurate estimate to be made of the ratio of breadth to thickness, gives at the same time

* See above, p. 110. † See pp. 82 & 102.

a very correct idea of the antero-posterior curvature of its shaft; though not so marked as in the Cro-Magnon series, this curvature is greater than in most of the femurs of the present day.

The lower extremity measures 82 millims. (3·23 inches) in maximum breadth; this is about the transverse dimension of one of the isolated lower extremities found at Cro-Magnon; the other was narrower, reaching only 75 millims. (2·95 inches).

We have only to notice towards the upper extremity the existence of a slight external antero-lateral flatness corresponding to the upper third of the shaft, and coexisting with an outward and backward deflection of the outer border of the bone. This anatomical feature (which appears to correspond with a special mode of insertion of the *glutei* and *vastus externus* muscles) is one of the most pronounced in the Old Man of Cro-Magnon; and M. Pruner-Bey has not failed to mention it. It is probable, however, that, if we had not from the beginning possessed osseous remains so exceptionally characteristic as those of that Shelter, this peculiar and constant conformation, which we indicate by the way, being only moderately apparent in the La-Madelaine subject, would, for some time at least, have escaped observation.

The tibia corresponding to the femur just described has a length of 38 centims. (15 inches) from one articular surface to the other. The femur measuring 46, the ratio of the shin to the thigh equals 82·6 per cent.; the same ratio in the Man of Mentone is 80·42. These two numbers are much higher than the mean in our existing populations, which is below 77. Moreover this tibia is platycnemic, after the fashion of those from Cro-Magnon, Mentone, &c. The full description given in this work, by Dr. Broca, relieves me from the necessity of further detail on this conformation. It will be sufficient for me to remind the reader that the transverse flattening known in England under the name of "platycnemism" since the publication of Mr. Busk's remarkable memoir*, is exemplified at Cro-Magnon by breadths of 26 and 28 millims. (1 and 1·1 inch) corresponding to thicknesses of 42 and 46 millims. (1·65 and 1·81 inch) at the level of the *foramen nutritium.* The tibia from La Madelaine has a thickness of 37·5 millims. (1·46 inch) and a breadth of 24 millims. (0·94 inch). An upper portion of the left tibia gives 25·5 for the breadth, and 39 for the thickness.

We have but a few words to say on the other bones of the lower limb, nearly all

* 'Transactions of the International Congress of Prehistoric Archæology, Third Session (Norwich and London), 1868' (8vo. London, 1869), pp. 160 &c. See also the 'Journal of the Ethnological Society of London,' January 1871, vol. ii. pp. 457 &c.

unfortunately much mutilated. These are:—the lower articular extremity of the left femur, similar to the corresponding part of the bone just described; the third lower quarter of the left fibula, repeating with considerable attenuations the morphology of the corresponding region of the fibulas from Laugerie, Cro-Magnon, &c.; a right calcaneum, of which only the non-articular portion remains, moderately salient behind (3 centims. or 1·18 in.), and bearing the impression of an extremely stout *tendo Achillis*; some unimportant fragments of a fourth left and a second right metatarsal; a first metatarsal of the left side, very robust and strong, 66 millims. (2·6 in.) in length, 13 millims. (0·5 in.) in breadth at its narrowest part, consequently exceeding in both these dimensions the similar bone of modern subjects of the same stature, and, besides, remarkable (like that of the Old Man of Cro-Magnon) for the largeness of the articular surfaces of its phalangial extremity (C. Plate IX. & X. fig. 13, *a*, *b*, *c*): this development, which is especially considerable on the plantar side, was certainly connected with peculiar agility of the toes, which must have executed with the greater facility more extensive movements of prehension.

In an adult European male subject the antero-posterior maximum development of the metatarso-phalangial articulation, measured circularly, is 3 centims. (1·18 in.); in the La-Madelaine man it reaches 35 millims. (1·38 in.); and in "No. 1" from Cro-Magnon it amounts to about 37 millims. (1·46 in.), which represents an augmentation of the extent of articular surface by nearly one fourth. This trait (the last we have to notice in concluding this sketch) is to be regarded as much rather connected with the manner of existence of a savage population than representing a more or less peculiar ethnic character. Indeed we find in a great number of individuals now living in a state approaching that of our Cave-dwellers modifications of the same order in the articular surfaces of the toes: the cups are hollowed out, while the heads of the metatarsals become rounder, the articular surfaces gain in extent above and especially beneath, and the corresponding movements are extended and facilitated.

Table of Measurements of the Crania.

	La Madelaine.		Laugerie Basse.							
			No. 1.		No. 4.		No. 2.		No. 3.	
	French.	English.	French.	English.	French.	English.	French.	English.	French.	English.
The Calvarium.	millim.	inch.	millim.	inch.	millim.	inch.	millim.	inch.	millim.	inch.
Diameter, maximum antero-posterior	....	....	....	....	195	7·677	179	7·047	172	6·771
——, inial	....	....	....	....	....	....	168	6·614	163	6·417
——, maximum transverse	....	....	140?	5·51?	146	5·748	134	5·276	129	5·079
——, maximum frontal	....	....	....	....	118?	4·65?	117	4·606	108	4·252
——, minimum frontal	92	3·622	....	....	97?	3·82?	97	3·819	86	3·386
——, maximum occipital	....	....	110?	4·33?	....	....	....	....	103	4·055
Curve, total horizontal	....	....	....	....	550?	21·65?	510?	20·08?	480	18·504
——, postauricular horizontal	....	....	290?	11·42?	....	....	....	....	269?	10·59?
——, transverse supra-auricular	....	....	300?	11·81?	....	....	....	....	270?	10·63?
——, antero-posterior, cerebral frontal	....	....	....	....	115	4·528	113	4·449	100	3·937
——, ——, frontal, total	....	....	....	....	135	5·315	133	5·236	117	4·606
——, ——, parietal	....	....	130	5·118	125?	4·92?	124	4·882	116	4·567
——, ——, cerebral occipital	....	....	68	2·677	....	....	74	2·913	68	2·677
——, ——, cerebellar occipital	....	....	56	2·205	....	....	More than 40	....	44	1·732
Angle, parietal auricular	....	....	64°	64°						
——, cerebral occipital	....	....	35°	35°						
——, cerebellar occipital	....	....	30°	30°						
Cephalic index	....	....	....	....	74·87	74·87	74·86	74·86	72·67	72·67
Fronto-parietal index	....	....	....	....	66·43	66·43	72·38	72·38	68·80	68·80
Fronto-orbital index	....	....	....	....	88·18	88·18	90·65	90·65	98·89	98·89
The Face.										
Breadth, external biorbital	107?	4·21?	....	....	111	4·370	107	4·213	87	3·425
——, internal biorbital	....	....	....	....	101?	3·98?	98?	3·86?	80?	3·15?
——, interorbital	25	0·984	....	....	24	0·945	26	1·024	19	0·748
——, inferior bimalar	....	....	....	....	85?	3·35?				
——, maximum, of the nose	....	....	....	....	26?	1·02?				
Height, subcerebral of the forehead	20	0·787	....	....	23·5	0·925	19	0·748	17	0·669
——, intermaxillary	....	....	....	....	20	0·787				
——, of the mastoid process	....	....	31	1·260	....	....	....	....	29	1·142

Other measurements are wanting, in consequence of the mutilation of the specimens.

XXVI.

NOTES ON THE REINDEER (CARIBOU) OF NEWFOUNDLAND.

By T. G. B. Lloyd, C.E., F.G.S., Member of the Anthropological Institute, &c., &c.

Two species (or varieties?) of Reindeer have been distinguished by zoologists on the North-American continent, under the terms of the "Woodland" and the "Barren-Ground Caribou"*. To the former of these belong the Caribou of Lower Canada, Nova Scotia, and Newfoundland.

The Caribou of Newfoundland grows to a large size. The average weight of a full-grown stag may be taken at about 300 lbs.; I have been informed by an Indian hunter that a very large one will weigh 400 lbs.; and Captain Hardy states, in his 'Forest Life in Acadie,' that a very large buck will exceed that weight: but Mr. Alexander Murray, F.G.S., of St. John's, Newfoundland, puts the weight at 250 lbs.

The varieties in the growth of the Antlers have been so fully described by previous writers that little need be added to their descriptions. A brow-snag, picked up on the barrens near the west coast of the island, measured across its palmated extremity the unusual breadth of 18 inches.

Mr. Alexander Murray informed me that the Caribou of the island has not been known to live more than two years under confinement.

During the rutting-season, which, beginning early in October, lasts about three weeks, the flesh, marrow, and internal organs of the stags acquire a peculiar odour, which slightly reminds one of the Skunk. At that time the meat is considered by the Indians to be uneatable; but I found the marrow and kidneys not at all unpalatable†. In the spring and winter their principal food is the

* See Professor Baird's "Description of North-American Mammalia" ('Pacific Railroad Reports'), Sir J. Richardson's 'Fauna Boreali-Americana,' and Dr. King's 'Account of Back's Expedition.' In 'Harper's Magazine' for November 1874 it is stated that Judge Caton, of Illinois, visited Europe during the preceding summer to study the Deer, and, contrary to his former conclusions, based on imperfect evidence, is satisfied that between the American and European Caribou there is no specific difference.

† Prof. W. H. Flower informs me that the Reindeer, like most other Ruminants, has a gland between the hoofs, which secretes an oily substance, the scent of which is supposed to assist the Deer in their search for one another.

"Reindeer Lichen" (*Cladonia rangiferina*). It is well known that the Caribou use their fore feet, and not their antlers, to get at their food under the snow; the "Provision of Nature," therefore, quoted by an eminent zoological authority, does not hold good in the case of the Reindeer. During the summer and fall they browse on the leaves of the young White Birch (*Betula papyracea*) and of "Moose Wood" (*Abies striata*). The Reindeer will also feed, according to Linnæus*, "on Frogs, Snakes, and even on the Lemming, often pursuing the latter to so great a distance as not to find his way back again; this happened, in several instances, two years ago, when these Rats came down in immense numbers from the mountains."

The Stags shed their antlers about the beginning of October, when they are often seen with only one of them remaining attached, which causes them to hold their heads on one side (may not such an occurrence have given rise to the supposed existence of the Unicorn? See above, p. 44). The Does retain their diminutive appendages till the spring; the "Not-does" of the Newfoundlanders, or "Nagwatfat" of the Micmac Indians, never have antlers. The "Barren Does" are not strictly infertile, as the name would imply, but are those which from various reasons have failed in producing their young; they are very fat during the fall of the year, and their flesh is highly esteemed as food. I have seen a Doe, when killed, with a part of her belly covered with milk; she had probably been sucking herself, as there was no fawn with her.

The island of Newfoundland may be divided into two sections by a line running from Hall's Bay, on the east coast, along Indian Brook, through Grand Pond, to St. George's Bay on the west coast, which may be called the northern and southern districts. The Caribou of the northern, like those of the southern district, enter the woods in the early part of June, where they remain until the latter end of July, frequenting the sides of the numerous streams, where their tracks on the sandy shores are often met with: at that season they wander about separately. About the beginning of August they move out of the woods, and betake themselves to the marshes and barrens; they now travel in a southerly direction along the well-beaten paths or "main leads," from which they diverge to rest awhile on some favourite feeding-ground—amongst the groves of Juniper or "Drokes," as they are called. On the advent of October the Stags select their mates; and small herds collect together, consisting of several Stags and a number of Does, as the case may be. At this season serious encounters take place between the rival "Monarchs of the Waste," as attested by the "locked" antlers occasionally

* Linné, 'A Tour in Lapland,' edited by J. E. Smith, 1811, vol. i. p. 162.

met with*. The Stags are now fearless of the approach of the hunter; and the Indians, imitating their peculiar grunting noise, easily "tole" them within gun-shot. On the approach of winter, as indicated by the first fall of snow, the small herds collect together into "companies," and, passing in a southerly direction, arrive in the neighbourhood of the dividing line already described, where they remain, on the marshes, until the second fall of snow compels them to continue their journey. The Micmac hunters, like the Beothuc Indians of former days, station themselves at different points along the waterside to intercept the Deer while crossing the water. When, from the "look-out" places near their wigwams, they see a company of Deer, which has been guided towards their stations by means of the Deer-fences†, swimming across the lake or river, they push out in their canoes, and massacre the defenceless animals with spears‡. Those Deer of the northern district which have escaped slaughter pursue their course towards the part of the island between White-Bear Bay and St. George's Bay, where they pass the winter, returning northwards in the spring.

The southern company leaves the district, between the dividing line and the Exploits Waters, about the month of October; and as many of them as have managed to pass the "Rubicon," between Exploits Bay and Red-Indian Pond, where the Indians lie in wait for them, travel down south towards Fortune Bay, where they remain till about Christmas time, when a portion of them retreat to the flat burnt district between Exploits Bay and Gander Bay, the rest remaining in the Fortune-Bay country, where they assemble in great numbers in the month of February. It is said that five or six Indians killed eight hundred head of Deer near Fortune Bay in the spring of 1866. About April the separated companies return northwards to the barrens, hills, woods, and valleys between Grand Pond and Red-Indian Pond, where they bring forth their young in June. It is said a good many Deer remain in the same district all the year round. The general description of the migrations of the Deer at different seasons was gathered from the Micmac hunters, whose occupation it is to watch their movements; but possibly it may not be accurate in all its details.

Besides the number of Deer destroyed by spearing, great quantities are annually

* I saw two pairs of antlers in St. John's so firmly interlocked that they could not have been separated without breakage: they had belonged to an old and a young Stag. One of the points of a brow-snag of the latter had pierced the orbit of the former, and had probably caused immediate death, entailing a fatal legacy for the survivor.

† See paper, by the Author, "On the Beothucs" ('Journal of Anthropological Institute,' vol. iv. p. 19).

‡ See Von Wrangel's 'Polar Sea,' p. 190, for a very interesting description of the spearing of Reindeer on the Aniuj River.

killed by stalking them on the barrens and marshes with guns; and sometimes they are caught in nooses set in their "runways."

Whilst living with an Indian hunter in his wigwam on the side of Red-Indian Pond, I was enabled to gain some information about the crossing of the Deer at that spot. The usual time is between the 1st and 10th of November, according to the weather; the Indians say the period gets later every year. The Deer arrive on the banks of the Lake in companies of from 50 to 100 in each, when, if there is much "lop" on the water, they wander along shore until it subsides. They then enter the water in succession, and swim across in Indian file. According to a calculation I made from data given me by one of the Indians, it would appear that a company, numbering about 482 head of Deer, has been seen in the water at one time.

As already mentioned, the Indians usually kill the Deer in the water by spearing them, because they consider that shooting them with guns is a needless and dangerous method. The spear-head is of steel, in the form of a common lance-head, attached to a pole about 10 feet in length. When the Deer is killed by a thrust between the short ribs, an attendant canoe is in waiting to drag the carcass to land. As many as five or six animals may be killed in this manner out of a company. It requires skill and adroitness to avoid upsetting the canoe, and to kill the animal by a single stroke of the spear, thus avoiding any unnecessary holes in the skin. The Indians never let out the blood by plunging a knife into its heart, nor by cutting its throat. When a Deer is dead the skin is stripped from the carcass; the kidneys and heart, with the fatty membrane about the intestines, are taken out and packed up in the paunch, to form a portion of the next meal, together with the head: the liver is not eaten by the Micmac Indians. The lower portions of the legs are separated from the knee-joint, for the sake of the covering of skin, which is used in making moccasins, and for the marrow in the metacarpal bones: the carcass is then cut up into quarters, which, with the portions above enumerated, are taken back to the camp. The skin is used either in making skin canoes, or is prepared for conversion into moccasins, and "babiche" for snow-shoes. If destined for the former purpose, it is merely shaved, and then sewn to other skins to cover the frame of the canoe*; if, on the other hand, it is required for moccasin-leather and babiche, it is first of all stretched on a rectangular frame of wood to dry, and subsequently thrown, in a moistened state, over a post driven in the ground, when the vellum is scraped from the inside by means of either a "Saska-

* See a description of the method of building a skin canoe in the 'Journal of the Anthropological Institute,' vol. iv. pp. 435–436.

dedagan"* (fig. 96) or of a "Jeegegan"† (fig. 97); the hair is next shaved off, and the bared skin is placed, for about twelve hours, in tan-liquor, made either

Fig. 96.

Sketch of a Saskadedagan used in dressing skins. Half the original size.

Fig. 97.

Sketch of a Jeegegan or Skin-scraper. Reduced.

The middle portion of the bone has been cut down and hollowed out, with the sides cut into sharp edges. One end of this specimen was enwrapped with pieces of cloth or other stuff.

from the bark of the "Var" (*Abies balsamifera*), or from that of the Black or the White Spruce (*A. nigra*, *A. alba*), or the White Birch (*Betula papyracea*); but the first is preferred: after this it is ready for use.

The sinews used for sewing are cut from each side of the backbone. They are prepared by being drawn out, one by one, with the teeth, and, when dried, rolled between the palm of the hand and thigh, at the same time being softened by being passed through the lips.

The skin, hoofs, and sinews having been cut away from the shank of the Deer,

* The Saskadedagan, an instrument in general use amongst the Montagnards of Labrador, is used in the following manner. A fold of the skin being seized by the left hand, the tool is taken round the middle in the right hand, and by a succession of downward strokes the vellum is separated from the skin. The Jeegegan is worked by scraping, with a movement of the arms, the skin which is laid across an inclined post stuck in the ground.

† An instrument of this kind is in the Christy Collection.

the metacarpal bones are roasted for a short time on the embers, and are then split longitudinally by a blow of an axe to extract the marrow. The marrow of the metatarsal bones is of a dry tallowy nature, and is therefore not much esteemed as an article of food. The portion of the Deers' meat not required for immediate consumption is placed on a scaffold, out of the reach of Bears and Wolves, where it remains until required, during the winter months, for "tailing" (baiting) the deadfalls of the trapper.

A set of phalangeal bones, seven in number, are occasionally cut and scraped into a conical shape, and strung on a strip of Deer's sinew, to one end of which is attached a portion of a Deer's tail; at the other end is fastened a bone skewer, fashioned out of a marrow-bone. This arrangement is used for playing the game called "Sabudedagan," which is somewhat like our cup-and-ball. This game is played also by the Montagnards of Labrador. It is called Nah-bah-wah-tah by the Ojibwas.

Note.—A careful study of the outline-drawing of a Reindeer on a piece of dressed antler, found in a cave at Thäingen, Canton of Schaffhausen* (fig. 98) has led me to the following interpretation of the artist's design.

The size and general outline of the body, together with the development of the antlers, as especially marked by the brow-snags, denote the characteristics of a full-grown Stag; the peculiar pinched-up form of the belly, apparently exaggerated by the draughtsman, coupled with the general emaciated appearance of the animal, is of common occurrence soon after the rutting-season. The eye is placed pretty nearly in its natural position, and appears to betoken the pleased and contented look of an animal in the act of browsing or drinking; but it may be remarked that the Reindeer, being possessed of greater acuteness of smell than power of eyesight, is accustomed to sniff the ground, to detect the near presence of an enemy or of one of its own kind. The suggestion, originally entertained by Dr. Keller, that grass and a pond (or river) are depicted, by the vertical marks and the long groove, on the opposite side of the piece of antler is, I think, probably correct; if it be so, however, it is hard to account for the "epuisée" appearance of the Stag, such as might be caused by a scarcity of food during snow-time, unless the animal had just come from bad quarters to good. In

* Mittheilungen antiquar. Gesellschaft in Zürich, vol. xviii. Heft 5, 1874, p. 125 &c.; and vol. xix. Heft 1, 1875, p. 35; Ann. Nat. Hist. ser. 4, vol. xv. February 1875, p. 149.

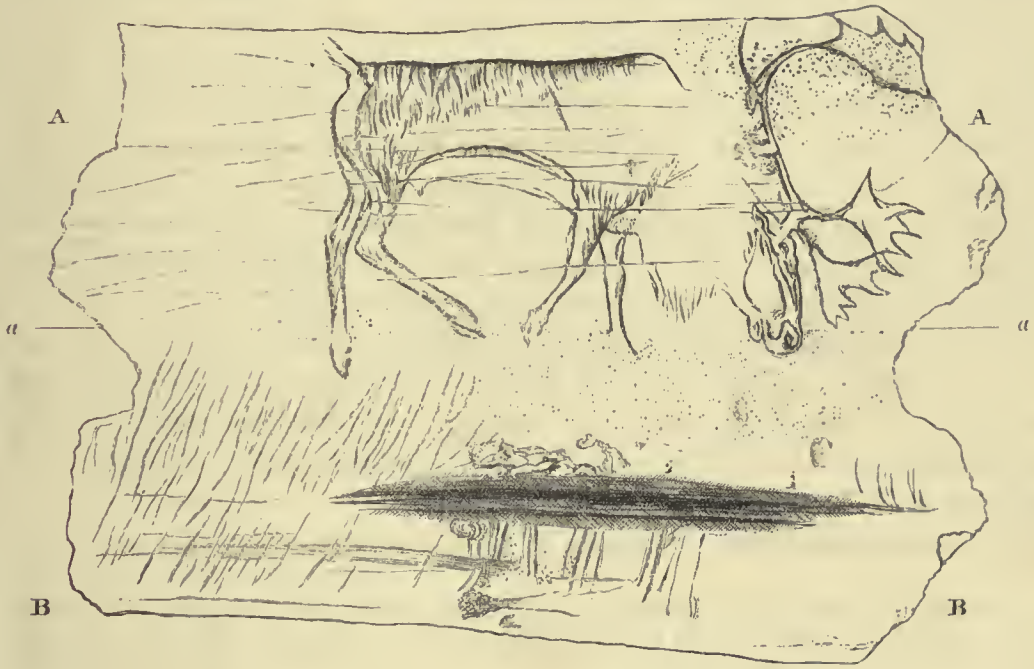
conclusion, I should say that the animal is figured as walking slowly along, with its nostrils near the ground, either for one or other of the purposes above mentioned.

It must be distinctly understood that the above remarks have been suggested by a comparison with the Caribou of Newfoundland.

Fig. 98.

Incised Outline of a Reindeer, on a piece of Reindeer Antler, from the Kesslerloch, a Cave or Rock-shelter near Thäingen, Canton of Schaffhausen, Switzerland. Natural size.

(*Copied from Professor Albert Heim's drawing in the plate illustrating his memoir "On a Find of the Reindeer Period in Switzerland," in the 'Mittheil. antiq. Gesell. in Zürich,'* vol. xviii. Heft 5, 1874.)



The surface of the cylindrical and engraved piece of Antler is here shown as if extended open:—

A, A, The side with the figure of the Reindeer;

B, B, The other side, bearing incised marks, possibly representing herbage and water.

a, *a* mark a line between the two sides of the engraved antler.

The one-holed Baton, Pogamagan, or Arrow-straightener (broken) which bears this remarkable engraving is figured in the 'Mittheil. antiq. Gesellsch. Zürich," vol. xix. Heft 1, 1875, pl. 8. fig. 68, among the many interesting illustrations of Herr Konrad Merk's memoir "The Cave-find in the Kesslerloch" &c.

XXVII.

NOTE ON *OVIBOS MOSCHATUS*, Blainville. By M. E. Lartet, For. Mem. G.S.

[Translated by the late H. Christy, Esq., F.R.S., F.G.S., and read before the Geological Society of London, June 7, 1865*. Reprinted with permission of the Council of the Geological Society.]

Cuvier has given the history of three skulls of *Ovibos moschatus* discovered in Siberia, and figured by Pallas and Ozeretskovsky†.

In 1846 M. Giebel ‡ noticed the existence, in the Museum of Halle, of part of a skull found in the neighbourhood of Merseburg.

In 1852 Sir John Richardson, in the 'Zoology of the Herald,' gave a list and figures of some remains of *Ovibos moschatus* brought from the Bay of Eschscholtz, with bones of Elephants, Reindeer, and other Mammals.

In 1855 Professor Owen § described, under the name of *Bos moschatus*, a fine fragment of skull of *Ovibos moschatus*, discovered by the Rev. Charles Kingsley and Sir John Lubbock at Maidenhead, in Berkshire, in a bed of low-level gravel, of which Mr. Prestwich gave at the same time a description ‖, with a sketch of the bed, in which he afterwards found an Elephant's tooth.

In the third edition of the 'Antiquity of Man' Sir Charles Lyell further cites a skull of *Ovibos moschatus*, found by Sir John Lubbock, near Bromley, Kent, in the valley of a small affluent of the Thames; and also two other skulls, male and female, discovered in the Drift of the Avon [at Freshford], near Bath-Easton, by Mr. Charles Moore ¶.

In the same page of the 'Antiquity of Man' Sir Charles Lyell further mentions

* [Quart. Journ. Geol. Soc. vol. xxi. pp. 474–476. A brief notice of the discovery of the *Ovibos* at the Gorge d'Enfer was also given to the Geological Society of France, April 3, 1865, 'Bull. Soc. géol. de France,' 2 sér. vol. xxii. p. 335.—Editor.]

† Ossemens foss. 4to, vol. iv. pp. 155–159.

‡ Leonhard und Bronn's 'Neues Jahrbuch,' 1846, p. 460.

§ Quart. Journ. Geol. Soc. 1856, vol. xii. pp. 124–131.

‖ *Ibid.* pp. 131–133.

¶ Antiquity of Man, 3rd edit. p. 156. [See also Cunnington, 'Wilts Magazine,' vol. iv.; C. Moore, 'Bath Nat.-Hist. and Antiq. Field-Club,' March 10, 1869; and for notices in full of the remains found in England (at Maidenhead, Greenstreet-Green, Freshford, Barnwood, Salisbury, and Crayford), see W. Boyd Dawkins's 'Monograph on *Ovibos moschatus*,' Palæontographical Society, 1872, pp. 19 &c.—Editor.]

a skull of *Ovibos moschatus* preserved in the Museum of Berlin, and which Mr. Quenstedt had determined in the year 1836; but I have failed, even with the indications given by Sir Charles Lyell, to find the description of this skull.

In 1859 Professor Hébert communicated to me a molar tooth found by the Abbé Lambert in the Diluvium of the Oise at Viry-Noureuil, near Chauny (Aisne), in association with remains of *Elephas antiquus* and *E. primigenius*, *Rhinoceros tichorhinus*, *Hyæna*, a small Bear, Reindeer, &c.* This tooth I ascertained to be a molar of *Ovibos moschatus*.

In 1863 Professor E. E. Schmid, of the University of Jena, described, under the name of *Bos Pallasii* (De Kay), a portion of skull of the same species discovered in 1862 in the ancient alluvium of the Saal †.

In 1864 Dr. Eugène Robert sent me a very fine piece of the skull of *Ovibos moschatus* discovered by him in the Diluvium of the Oise at Precy, near Creil (Oise), in the same spot where he had collected the remains of an Elephant's tusk. I announced this discovery to the Academy of Sciences at its sitting on the 27th of June; and I addressed to the Geological Society of London an extract from my communication, with a plate, in which were figured this skull and the molar teeth found at Viry by the Abbé Lambert ‡.

Further researches at one of our Stations in the Gorge d'Enfer (Dordogne) have produced a hoof-phalange exactly identical, both in form and dimensions, with the corresponding bone of the existing *Ovibos moschatus* (*Bos moschatus* auct.). It was found, in association with remains of the Great Cave-Bear (*Ursus spelæus*), Lion (*Felis spelæa*), Wolf, Reindeer, and Aurochs.

[Since this paper was communicated to the Geological Society, the author has discovered, among the fossil remains of the same Station in the Gorge d'Enfer, seven new bones of a hind leg and foot of *Ovibos moschatus*—the long and marrowed bones being split and broken, like those of the other Herbivora used for food by the ancient indigenous tribes of Périgord.]

It is to be noted that in the three localities where the bones of *Ovibos moschatus* have been observed in France, there have been also gathered the products of human industry.

At Viry-Noureuil worked flints were found by the Abbé Lambert, of which two specimens were sent to London. At Precy was found, in 1860, an axe of the St.-Acheul type, which was presented to the Geological Society of France by

* Ann. des Sc. Nat. 8vo, 4e sér. Zool. vol. xv. p. 224.

† Leonhard und Bronn's 'Neues Jahrbuch,' 1863, p. 541.

‡ Comptes Rendus de l'Acad. des Sci., Séance 27 Juin 1864.

M. de Verneuil at its sitting of the 21st of May, 1860, and of which Sir Charles Lyell makes mention in pages 152 and 153 of the 'Antiquity of Man' [Fourth Edition, 1873, p. 199].

At the Gorge d'Enfer worked flints have also been found, as well as Reindeer-horn unbarbed lance-heads * of a type differing from those found in any other of the Dordogne Caves, but identical with those of Aurignac (Haute Garonne) and of Chatelperron (Allier).

The discovery of this fragment [and other bones] of *Ovibos moschatus* in the Gorge d'Enfer gives us the most southern spot where this species has been observed †; and its Quaternary habitat ‡ is carried down fifteen degrees south of its existing limit in North America, where it is known that this animal is rarely found below the sixtieth degree of latitude.

The Reindeer, whose migrations are still more extensive, advanced yet further south during the Quaternary Period, as I have found its remains on the northern slopes of the Pyrenees. [See *above*, page 147 &c.]

* [For subsequent notices of these lanceolate harpoon-heads and arrow-points of Reindeer-antler, found at the Gorge d'Enfer and Cro-Magnon, see *above*, page 94, and in the Description of Plates, B. XII. & XIII., pages 95 and 97.—Editor.]

† The supposed skull of *Bos Pallasii*, De Kay, from the alluvium of Mississippi at New Madrid, has been recognized by Mr. Leidy as referable to his genus *Bootherium*.

‡ [Among the many interesting relics left by the Cave-folk in the Kesslerloch, near Thayngen (Thäingen), Canton Schaffhausen, is a carved head of a Musksheep (see 'Mittheil. antiquar. Gesell. in Zürich,' 1875, vol. xix. part 1, p. 36, pl. 7. fig. 66), showing that the early inhabitants of that part of Switzerland had some knowledge of this animal.—Editor, *July* 16, 1875.]

SUPPLEMENTAL NOTES:

ADDENDA ET CORRIGENDA.

I.—PART I. ESSAYS Etc.

Page 15. The Adze represented by fig. 12 was probably derived from New Caledonia (not from the Solomon Islands). A similar specimen is figured by G. Forster in 'Cook's Voyages,' *fide* Steinhauer, 1866.

Page 19. This Map is superseded by the engraved Map at page 126.

Page 20. A chronological classification of the Caves, by reference to the style of the Implements &c. found in them, was offered by M. G. de Mortillet (in the 'Comptes Rendus,' 1869, and 'Matériaux,' 1869, sér. 2, vol. i. p. 172), viz.:—1 (oldest). Epoch of Le Moustier; 2. Of Solutré; 3. Of Aurignac; 4. Of La Madelaine. Followed by the "Polished-stone Age."

Page 39, line 21. *For* Sillooett *read* Lillooett.

Page 53 (and p. 102). In illustrating a similarity of ornament and intended purpose, noticeable in the *perforation* of the Reindeer antlers from the Caves of Dordogne and the pieces of antlers used by the Laplanders as tapping-sticks for their Magic Drums, the reader might think that we ought also to have referred to the perforated hammer-like portion of antler from Aurignac, figured and described in the 'Ann. Sc. Nat.' sér. 4, vol. xv. pp. 189 & 250, pl. 10. fig. 5; but we were assured by the late M. E. Lartet that this hole seems to have been differently made and with other intentions.

Page 57. The relationship of the archaic Cave-folk with the Fenni, Fins, Laplanders, and Esquimaux, is also treated of by Boyd Dawkins, Lubbock, and Lane Fox in the following extracts:—

(1) The Editor's Notes to Sven Nilsson's 'Stone Age' &c.*, 1868, p. 262.

"My friend Mr. Boyd Dawkins, in his Memoir on the British Fossil Oxen, Quart. Journ. Geol. Soc. vol. xxiii. (1867) p. 183, boldly asserts that the Cave-men of Périgord were 'a people more closely allied to the Esquimaux than any other,' and sums up, as follows, the evidence in favour of this assertion.

"'The identity of form of the harpoons, of fowling-spears, marrow-spoons, and scrapers; the habit of sculpturing animals on their implements; the absence of pottery; the same method of crushing the bones of animals slain in hunting, and their accumulation in one spot; the carelessness about the remains of their dead relatives; the fact that the food consisted chiefly of Reindeer, varied with the flesh of other animals, such as the Musksheep; and especially the small stature, as proved in the people of the Dordogne Caverns by the small-handled dagger figured by MM. Lartet and Christy in the 'Revue Archéologique' (1864) and in the 'Prehistoric Times' (Lubbock, 1865), p. 255. This combination of characters is found, so far as I know, among no other people on the face of the earth except the Esquimaux; and therefore I cannot help believing that people in South Gaul occupies the same relation to the Esquimaux as the Musksheep and Reindeer, on which they lived, held to those now living in the northern regions.'

"Since this was written Mr. Busk has shown that the *Ursus priscus* of our Caves is undistinguishable from the Grizzly Bear of the Rocky Mountains. There is therefore some reason for the belief that the Esquimaux once inhabited Western Europe."

(2) Treating of some incised marks, monogrammic or literal, and neither Runic nor Ogham, but possibly related to the latter, Colonel A. Lane Fox, F.S.A. &c., thus writes, in his Memoir 'On Roovesmore Fort, and Stones inscribed with Oghams in the Parish of Aglesh, County Cork,' 1868, pp. 11, 12:—

"Viewing the resemblance of the Picts' houses and tumuli which abound in the neighbourhood [Island of Bressay] and throughout Ireland and the west of Scotland to the Yourt and Igloo of the Esquimaux, and many other points of resemblance in the implements of the two countries, that might be noticed, and considering also the geographical position of these [inscribed] Bressay stones, upon the confines of the 'Ogham' region and inclining towards that of the Greenlander and Esquimaux, it seems not impossible that these inscriptions may eventually be found to establish some link of connexion between them—an hypothesis rendered all the more probable by considering the very wide extent of territory over which the Esquimaux now range, extending from Greenland on the one hand to Behring Strait on the other, and their affinity to the Tchukchi and even to the Laplander of Europe and Asia. This view of the case is also confirmed by the discoveries which have recently been made in the French Caves, tending, in the opinion of the explorers of these caves, to shew that a race akin to the Esquimaux in their arts and implements, if not the Esquimaux race itself, did actually occupy Europe, in conjunction with the Reindeer, at a time anterior to that in which the Ogham character must have originated in Great Britain and Ireland."

(3) In 'Nature' (April 22, 1875), vol. xi. p. 493, Mr. Charles E. de Rance, F.G.S., thus refers to the probable relationship of the existing Esquimaux and the Cave-folk of the Dordogne:—

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* 'The Primitive Inhabitants of Scandinavia' &c. By Sven Nilsson. Third Edition, revised and translated by the Author, and edited by Sir John Lubbock &c. 8vo. London, 1868.

"The Esquimaux inhabitants of the coasts of Arctic America, from Behring's Strait to Greenland, speak the same language, and use similar implements. There is no more interesting passage in Prof. Dawkins's recent work* than that in which he compares the identity of type of these implements with those from Dordogne and other parts of France, and Belgium, both as regards fowling- and fishing-spears, darts, and arrows; this likeness extends to the actual shape of the base for insertion into the haft, the haft being formed of Mammoth ivory, derived from the frozen cliffs, of the very species that was hunted by Palæolithic Man in the South of France.

"These two peoples, separated so widely in time and space, were alike in their artistic feelings and methods of incising (on tusks, antlers, and bones) representations of familiar objects; alike also in their habit of splitting bones for marrow and accumulating them around their dwellings, in their disregard for the sepulchre of their dead, in their preparation of skins for clothing, and in the pattern of the needles used in sewing them together; alike also in their feeding on the Musksheep and the Reindeer, and in other characteristics. It is well-nigh impossible to resist Prof. Dawkins's conclusion that the Esquimaux is the descendant of Palæolithic Man, who retreated northwards with the Arctic Fauna with which he lived in Europe; though before the close of the Glacial Epoch it is probable that a continuous land-connexion existed between France and North America by way of Siberia, remains of the true Horse having been discovered associated with *Bison priscus* and the Mammoth in Arctic America, and representations of the Horse, by a palæolithic artist, occurring on an antler from La Madelaine, and the entire skeleton of a Horse from a palæolithic Station being preserved in the Lyons Museum.

"Sir John Richardson† speaks of the Kuskutchchewak people who inhabit the banks of a river flowing into Kuskokvim Bay, Behring Sea, as believing that the Mammoth, whose tusks they constantly find, came from the east, and were destroyed by the spells of their *Shaman*."

Page 60 (footnote). It may be added that in the 'American Journal of Science and Arts,' vol. ix. (May 1875) pp. 335 &c., Prof. James D. Dana criticises the statements of the late Dr. Albert Koch regarding the detailed circumstances of the discovery of a Mastodon near the Bourbeuse River, Gasconade County, Missouri, in 1838, in association with presumed evidence of human agency, indicated by blocks of stone, stone implements, and action of fire. Prof. Dana says (p. 335):—"The evidence of the contemporaneity of Man and various extinct Quaternary Mammals in Europe and Great Britain is complete; that is, it is beyond reasonable doubt or question; for (1) it has been gathered with great care by the best of geological observers, (2) it has been verified through the re-examination of reported cases by other able geologists, and (3) it has been further verified by the special investigations of Committees of Scientific Societies. The North-American facts thus far announced have not, unfortunately, the same broad basis for confidence." The Professor goes on to show (p. 337) "that Dr. Koch was a man of enterprise, 'an indefatigable collector,'" and that "the credit is due to him of having performed a great service to science by his

* "Cave Hunting. London: Macmillan, 1874."

† "Arctic Search Expedition. London, 1851."

collections," but that not being at all a good geologist, and not having been "trained to investigation, or to habits of precise statement" (p. 345), and not being wholly trustworthy, Dr. Koch's supposed charring of the body and calcining of the bones, his presumed weapons of offence, and statements as to posture and condition cannot be implicitly believed, and his "evidence of the contemporaneity of Man and the Mastodon" is therefore "*very doubtful.* It is to be hoped" (Prof. Dana proceeds to say) "that the Geologists of the Missouri Geological Survey now in progress will succeed in settling the question positively. The contemporaneity claimed will probably be shown to be true for North America by future discoveries, if not already so established; for Man existed in Europe long before the extinction of the American Mastodon" (p. 346).

See also page 157, where Mr. Alex. C. Anderson, referring to the contemporaneity of Man and the Mastodon, although not doubting its probability, points out that great care is always required in these investigations to avoid fallacious inferences; and he explains how in one instance the remains of a Mastodon, exposed through the action of the wind, appeared in juxtaposition with numerous human skeletons, which are constantly becoming in like manner exposed, and again re-covered by the shifting sands. In a letter, dated November 20, 1868, and alluding to these bones in the great sandy flats of the Columbia River, Mr. Anderson had already remarked:—

"The appearances of antiquity in both were not obviously different; and an uninformed or hasty observer might have jumped to a very erroneous conclusion. It happened, however, that the history of the human remains was well known to me and others of the older frequenters of the North-west as being, notwithstanding their antiquated appearance, of very modern date; and thus a very plausible hypothesis was spoilt. These remarks, however, are not intended as derogatory from the accuracy of the conclusions that may have been arrived at in the other case referred to, but solely to show that a fortuitous coincidence of widely different circumstances might in some cases mislead the observer very gravely."

Page 70 &c. *Buried Weapons &c., and Local Abundance of Stone Implements.*—Dr. R. Brown, F.L.S. &c. offered the following remarks in a Letter dated September 28, 1868:—

"The reason for Savages, in all ages, burying implements with the dead is, I think, a little misunderstood, and has, to a great extent, got into the domain of romance. I once asked an Indian Medicine-man in Klamath County, Southern Oregon, the reason why they burnt all the property of a deceased person—was it to help him on his way to their after-land? was that the reason why even slaves and horses were destroyed? He assured me that the true reason was, that, as Indians think it very unlucky to talk about the dead (a universal superstition), his property was destroyed so that there might be no temptation for children or careless people to mention his name, by the recollection of the dead person being continually called before them by the sight of his former property. I give this account for what it is worth. The natives further north have the same superstition about the dead; but the reason of their putting property

on their graves must be somewhat different, as that property is exposed full to view and often close to the village. In Greenland, to this day, the civilized Eskimo destroy the Kayak-cover on the death of its owner, but keep the wooden frame. You will find some account of this and similar customs in Mr. Sprout's 'Scenes and Studies of Savage Life' (among some of the Vancouver Indians), and in a review of that work in the September Number of Murray's 'Journal of Natural History and Travel.' Trophies of war are with these Vancouver Indians exhibited in full sight of all the village, so that all may see them and have their hatred of their enemies kept alive. The coast-tribes, going to war in canoes, take the natural trophy—the *head* of their enemy. The horse-tribes, travelling great distances on horseback, could not of course take the heads, as these would be rather inconvenient to carry home; and accordingly the scalp is alone taken. Both trophies, however, are treated in the same manner, viz. fastened to poles in front of the village. It is curious how the barbarous mind among all people and in all ages is the same—the fastening of heads above Temple Bar or on Old London Bridge, in 1568, or on the poles in front of a savage village in Vancouver Island in 1868! Have you heard of any human remains being found suggesting that Prehistoric Man was addicted to war?

"We need not be surprised at the vast number of implements often found in old abodes or other places. These (independently of the accumulation of generation after generation of flint-tool users) are often the *débris* of the workshops of the old savage arrow-point- and spear-makers. There is a division of labour among some savages; and I know that on the western shores of Vancouver certain families have the monopoly of certain trades, while others follow the making of peculiar implements as a branch of business. Longfellow only gives poetical expression to a known fact when he talks, in 'Hiawatha,' of 'the ancient Arrow-maker, in the land of the Dacotahs,'" &c.

Page 87, line 12. *For* At this *read* For that.

Page 94, line 18. See M. Lartet's paper on remains of the Musk-ox, or Musk-sheep, found at the Gorge d'Enfer, 'Quart. Journ. Geol. Soc.' vol. xxi. p. 474, and *above*, p. 280.

Page 95, line 17. See M. Gervais on Remains of the Saiga found by M. E. Pictte in the Cave of Gourdan, 'Matériaux pour l'hist. de l'Homme' &c., sér. 2, vol. iv. 1873, pp. 270, 271, and fig. 74 (p. 396).

Page 97. Dr. P. Broca has also treated of the Crania and Bones from Cro-Magnon, at Les Eyzies, in the 'Transactions of the International Congress of Prehistoric Archæology, 3rd Session, Norwich and London, 1868,' 8vo, London, 1869, pp. 168–175.

Pages 99, 101, &c. *Worn Teeth.*—In a Letter dated November 20, 1868, Mr. Alex. C. Anderson, of Victoria, Vancouver's Island, says:—

"I may observe in regard to the worn condition of the teeth in the human remains found in the Cave of Cro-Magnon, that the same effect is very noticeable among such of the Indian tribes as inhabit a dry sandy locality, and whose winter provision consists chiefly of meats or fish dried in the sun*. Minute particles of sand carried by the winds become incorporated with the food in the process of drying; and hence the

* [Similarly flat-worn teeth are observable in civilized people when the teeth are exactly opposite and fit throughout, crown to crown.—Editor.]

consequent attrition. In the vast volcanic region bordering on the Columbia River, from the Dalles of Wascopum upwards, this effect is peculiarly conspicuous. The teeth of the inhabitants, whose winter diet is chiefly dried Salmon and various indigenous roots, are invariably much worn before mid-age; of the elders in most cases absolutely to the gums. Notwithstanding this condition of the teeth, however, *caries*, or at least its outward manifestation, is not prevalent."

Page 138 (last footnote). At the page quoted, referring probably to both Spain and the Balearic Islands, Pliny writes:—

"Necnon et vestes leporino pilo facere tentatum est, tactu non perinde molli, ut in cute, propter brevitatem pili dilabidas." (Valpy's Edition.)

Page 160, fig. 57. Compare fig. 6, pl. 20, 'Matériaux,' vol. v. (sér. 2, vol. i.) p. 355. Similar specimens, barbed on one or both sides, from the Dordogne Caves, were exhibited in the International Exhibition, at Paris, July 1867.

Page 169. *Laugerie Basse.*—This Station has yielded many good specimens since Mr. H. Christy's diggings were discontinued. Among the most interesting of the objects obtained by M. E. Massenat, M. l'Abbé Landesque, and others, may be mentioned:—

1. Engraved and Sculptured Objects: from M. E. Massenat's Collection. 'Matériaux,' sér. 2, vol. i. 1869, p. 348, pls. 20–22.
2. (1) Human Skeleton, see *above*, page 255; (2) a small bizarre Statuette of an animal sitting on its haunches, like a Cat (?); (3) a sculptured Deer's Head; and (4) a Cowrie Shell, perforated by a notch. 'Matériaux,' sér. 2, vol. iii. 1872, pp. 224 &c., pl. 9. M. E. Massenat.
3. Piece of Sculptured Ivory: from M. E. Massenat's Collection. 'Matériaux,' sér. 2, vol. iv. 1873, p. 394, pl. 24.
4. Engraved Bones and Antlers: from M. E. Massenat's Collection. 'Matériaux,' sér. 2, vol. iv. 1873, pp. 395, 396, figs. 66–73.
5. Sculptured and engraved Bones: from M. E. Massenat's Collection. 'Matériaux,' sér. 2, vol. v. 1874, pl. 4, illustrating M. Pietto's memoir on the art and civilization of the Cave-folk of the Reindeer Period.
6. Engraved Bones (Woman and Horses): in M. l'Abbé Landesque's Collection. 'Matériaux,' sér. 2, vol. v. 1874, p. 276, figs. 72, 73.
7. Small Human Statuette in Reindeer Antler. 'Matériaux,' sér. 2, vol. v. 1874, p. 287, fig. 103; and a Pogamagan; *ibid.* p. 288, fig. 104. In the Collection of M. l'Abbé Landesque.

Page 189, line 8 from top. Figure 1 of B. Plate XIII. is referred to by Dr. Broca as a Tally-stick or Hunting-score ('Les Troglodytes de la Vézère,' 1872); and probably that was its use.

Page 189 (footnote), line last but one. *Delete* the comma *after* twisted.

Page 189. *Tallies.*—In the 'Times' of November 3, 1874, the writer of a "Letter on Peasant-Farming" states that in Norfolk, in the early part of the 19th Century, as told by an old man who was eighteen years old in 1811, shepherds told off the sheep once a year, "and the Tally was kept in this way: we cut notches round a

stick, one notch for each sheep; then we split the stick in two, and the farmer kept one half and the shepherd the other till next year."

In Charles Knight's 'Old England,' 1844, vol. i. are figures and notices of:—(1) Signs for docketed documents, p. 114, fig. 467, 1-14; (2) a Clog Almanack, p. 115, fig. 472; (3) an Exchequer Tally, p. 115, fig. 471; and (4) a Saxon Reeve-pole, formerly used in the Isle of Portland by the Collector of the King's Rents, p. 115, fig. 473.

Page 190. *Score.*—In the Game of Cricket it is usual for some players to record a run as "scoring a notch." (T. K. Gay.)

Page 190. *Tally.*—Dr. Robert Brown, F.R.G.S., writes to me that

"At Riga in former times (if not still, for all I know to the contrary) the cargo sent down to a vessel was checked by means of tallies. The Mate, who received the cargo, and the man who brought it down (or the merchant's agent), had each a stick. As each load was brought down, the two sticks, which were exactly the same, were placed together, and a notch made on them in a transverse direction. The result was that it was impossible for either party to cheat in the number of loads of merchandise sent down; for, if an attempt was made to do so, then instantly, when the sticks were placed together, the tell-tale notch, which did not match the one in the other stick, settled the point."

Page 190, line 14. Shakespeare also alludes to the notched stick used by the "homely swain" to reckon time and times, in 'K. Henry VI.' Part 3, Act ii. Scene 5; and in 'Taming of the Shrew,' Induction, Scene 2, "if she say I am not fourteen pence on the score for sheer ale, score me up for the lyingest knave in Christendom," illustrates the common use of "scoring."

Page 190 (footnote). *Esquimaux Aide-de-mémoire.*—The late Mr. Gay met with further evidence that scoring or notching has been used for intercommunication, in Sir E. Belcher's memoir on the Works of Art of the Esquimaux, 'Trans. Ethnolog. Soc. London,' new series, vol. i. 1861. At page 135 it is remarked that

"Dr. Rae has referred to their signs, counting on their fingers, &c., and considered that they have no records. At Icy Cape I had occasion to think otherwise, and that the apparent counting on the fingers has a deeper signification than mere numerals. And they added, in the instance to which I refer, the seeking for a pair of notched sticks similar to a Baker's Tally.

"Making use of the sticks and working with the fingers, apparently using each joint to denote some signal, and the front and back as variations, possibly as past and future, they at length, by the intervention of the seer (which I think has been noticed by Beechey), made me understand that something preceding my visit was referred to; and since then I have been induced to think that it related to some matters connected with Sir John Franklin's boat-expedition in 1826-27, passed on from tribe to tribe by tradition."

Page 191. The New-Zealand *Aide-de-mémoire* has its analogues amongst the Miantsze or Aborigines of China, of whom Mr. William Lockhart writes, in the 'Trans. Ethnolog. Soc. London,' new series, vol. i. 1861, p. 185:—

"Among some of the tribes a knowledge of letters is possessed, either of Chinese books or of their own written language, which is supposed to be engraved on slips of wood or carved on palm-leaves. Some have no knowledge of any written language or of a regular calendar. *For records of events they use pieces of carved or notched wood.* Some tribes have writing, on sections of wood, in the seal character, which are taken great care of, and may be of much interest from their antiquity."

Page 193. *Owner-marks.*—Besides the many examples of ornamentation on the Spear-points, Dart-heads, and other implements of Reindeer-antler, found in the Kesslerloch, near Thayngen, and figured in the 'Mittheil. d. antiquar. Gesell. in Zürich,' vol. xix. part 1, plates 2–8, there are some incised markings which must be regarded as Owner-marks, namely:—fig. 15 (p. 26), angular and straight lines arranged thus ⊃ ⊃ |; fig. 33 (p. 43), like this ▷ ◁ ▷, perhaps imperfect, on a broken Dart-head. In fig. 43 (p. 31) the branched line crossing a circle, though clear in the drawing, is of doubtful value. In fig. 13 (pp. 26, 27) a groove, cut along two thirds of the tapering Dart-point, is succeeded by sixteen transverse, parallel, short, broad notches, which fill the space between the lower end of the furrow and the bevel of the wedge-shaped butt. The whole may have constituted an Owner-mark (see B. Plate XXVI. fig. 1); or the groove may have been intended for poison, and the notches may have marked a hunter's score.

Page 197. *Private Marks.*—On the Ramsgate steamers, newly arrived baggage is marked by the porters with private chalk marks, which ensure the luggage being left to the care of one special set of the porters.

Page 200. With regard to the *Pitted Markings* on some implements, the late Mr. Gay drew my attention to a set of Divination Dice ("Dés à deviner et à jeter le sort"), from the Basutos, presented by Miss Powles to the Christy Collection. They consist of:—(*a*) three white (natural) astragali of small Deer or Antelope; (*b*) three others stained dark red; (*c*) four triangular pieces of small hoofs (Antelope?), three hollow and one solid, engraved on one or more faces with patterns of pits, furrows, and raised lines; (*d*) a flat finger-shaped piece of bone, engraved on one side with five pits encircled by rings; (*e*) a small skin bag, containing a little red powder, resembling comminuted wood. The whole are closely strung together on a thong.

Somewhat similar Divination Dice are referred to by Henry Lichtenstein, in his 'Travels in Southern Africa in 1803–06' (2 vols. 4to, London, 1815); at p. 332, vol. ii., he figures three such dice (fig. 11; copied in Wood's 'Natural History of Man,' "Africa," p. 323), and says:—

"Fig. 11. The Magical Dice, made of the cloven feet of Antelopes as described in page 317. I could not learn the signification of the figures carved on the outside; one is not unlike the double Hebrew *Schin*, a

sign to which great consequence was attached by the Jewish priests, and which, in common with many other things in the customs, manners, and modes of life among these people, reminds us very much of the ancient eastern nations. The antiquarian would perhaps find in these dice the *tali* and *astragali* of the ancients."

The description of the Divining Dice, and the mode of using them by the Bechuanas, near Kuruman, given at page 317, is as follows:—

"Among the few things that I wished earnestly to possess was a pair of dice, if so they might be called, which one of the most distinguished among them wore, fastened to a leather thong, round his neck. I say, *if they might be called dice*, because, though they were employed much in the same way, the form of the objects in question was not cubical like that of a die; they had the figure of equal-sided pyramids, and were cut out of the cleven foot of an Antelope, being stuck upon small thin quadrangular plates of the same material. The use of these things, as I learned, was to determine, when any thing of importance was to be undertaken, whether it would terminate happily or not. But few persons (the priests only, as far as I could collect) know how to prepare them; they descend as an inheritance in families; and the more ancient they are, the greater reliance may be placed on their prophetic spirit. In order to see how they were used, I entreated the owner to tell me whether our journey would be happily ended or not. He immediately bent himself down on one knee, smoothed the ground with his hand, and then held the dice between the points of his fingers, one in each hand, and after making several movements with his hands up and down, and pronouncing some incomprehensible words, threw them on the ground. He then bent himself down, appeared to examine very carefully the situation of each, and their direction towards each other, and, in about two minutes, pronounced that we should reach home without any accident. My very great desire to possess these magical objects made me not object to the high price required for them; and, after purchasing two young oxen with some beads and knives, I gave the oxen for my dice, recollecting, as a balance against this somewhat unreasonable bargain, many other very equal ones which I had concluded."

Page 201.—*The Ornamental Markings on the Aquitanian Implements.*—Besides the use of the *Significant Marks* above described, the general application of ornamental figures and patterns to their bone Implements by the Aborigines of Aquitania, and even to isolated pieces of stone, bone, and ivory, may really have arisen from the several impulses, habits, and intentions indicated in the foregoing pages. There is, however, another possible source of this custom, not there alluded to, but intimated by Dr. Broca in his Essay on the Cave-men of the Vézère ('La Revue Scientifique de la France' &c., 2e sér., vol. ii. pp. 457 &c., 1872; and 'Nature,' March, 1873), namely that, as regards weapons of war and the chase and implements of superstition, under the social order and state-culture which he supposes to have existed among them, the grades of rank may have had special signs and symbols on their characteristic arms and official implements and sceptres.

In reference to these possibilities, we may add a suggestive note from the Rev. A. M. Fairbairn's remarks on the Semitic Races in their religious aspect ('The Contemporary Review,' Oct. 1873, vol. viii. p. 792):—

"Religious emblems were everywhere—on buildings, garments, ornaments, signets; almost every weapon of war or the chase, every domestic or agricultural implement had its sacred sign."

Page 206. M. E. Lartet's account of this specimen of engraved tusk appeared also in the 'Annales des Sc. Nat.' 5e sér. vol. iv. 1865.

Page 212.—Subsequently to the printing of Sheet "2 F" (pp. 205–212) appeared Dr. Louis Lartet's short memoir, "Gravures inédites de l'âge du renne, paraissant représenter le Mammouth et le Glouton," in the 'Matériaux pour l'histoire de l'Homme,' 2e sér., vol. v. pp. 33–36, with woodcuts of (1) two lively heads of the Mammoth, in outline, on a plate of bone from Périgord (figs. 20 & 21), and (2) of the Glutton (fig. 22), which we have also figured, from a Photograph, at p. 209, fig. 80.

Page 216. *Reindeer.*—Some Notices of the Lapland Reindeer are given, by M. Xavier Marmier, in P. Gaimard's 'Voyages en Scandinavie' &c., 1842, vol. i., Relation du Voyage, p. 336; of the Spitzbergen Reindeer in Von Heuglin's 'Reisen' &c., 1872, Part 1, p. 192, and in J. C. Wells's 'Gateway of the Polynia' &c., 1873, p. 223.

Page 229, No. 8. Known as the common Kite or Glede.

Page 231, No. 14. Usually called the Little Owl.

„ „ No. 15. Known as the Passerine Owl.

Page 234, line 17. *For* Couchas *read* Choucas.

Page 235, lines 3, 9, 12, 16. *For* the Chough *read* this Chough.

Page 236, line 8 from the bottom. *For* Lagopodes *read* Grouse.

Page 238, line last but one. *For* Kjokkenmöddings *read* Kjökkenmöddings—*or rather* Kitchenmiddings *or* Kitchenmiddens.

Page 240, lines 13 and 18. *For* Lagopodes *read* Grouse.

Page 244, line 14. *For* diaphyses *read* shaft-bones.

„ „ No. 50. This is known also as the Gargany.

„ „ No. 51. Read THE ——? DUCK.

Page 248, line 16. *For* 27 *read* 29; *for* 30 *read* 32.

„ „ line 17. *For* Nos. 28 and 29 *read* No. 31.

II.—PART II. DESCRIPTIONS OF THE PLATES.

Page 3, A. Plate II. See Note at page 26. Compare figs. 9, 10 with fig. 6, A. Plate XXXII. pages 133, 134.

Page 9, B. Plate I. Barbed Harpoon- or Arrow-heads of bone from the Swiss Lakes are figured by Keller (Lee's Translation, pl. 5. fig. 3; pl. 20. fig. 26; pl. 54. figs. 26, 27. In the 'Matériaux pour l'Hist. de l'Homme,' we have figures of similar barbed points, vol. v. pl. 20. fig. 5 (Laugerie Basse); vol. vi. pl. 11 (Pyrenees), &c.

Page 10. Add to second footnote "and 'Annales Sc. Nat.' sér. 4, Zoologie, vol. xv. pl. 13. figs. 3, 5, 6, pp. 205 & 253."

Page 11, line 20. *For* at *read* of.

Page 16, B. Plate II. fig. 8. Among the other known figures of Human Form discovered in the Caves of France may be mentioned:—

1. A small, imperfect, ivory Statuette of a Female from Laugerie Basse: in the Collection of the Marquis de Vibraye. 'Matériaux,' vol. iii. 1867, p. 209.
2. Figures of Human Hands. 'Reliq. Aquit.' 1867–70, p. 69, B. Plate IX. figs. 1*a*, 1*b*; and p. 122, B. Plate XVII. fig. 6.
3. Figure of a Man, creeping after a Bison Bull, or swimming (?): in E. Massenat's Collection; from Laugerie Basse. 'Matériaux,' sér. 2, vol. i. 1869, p. 353, pl. 21. fig. 1.
4. Human Head. 'Matériaux,' sér. 2, vol. i. 1869, p. 355, pl. 21. fig. 4.
5. Human (?) Outline &c. 'Matériaux,' sér. 2, vol. i. 1869, p. 355, pl. 22. fig. 1.
6. Imperfect Human Outline on slate; from the Grotte d'Aurensan, Pyrenees. 'Matériaux,' vol. vi. 1870, p. 205, pl. 11.
7. Outline (imperfect) of gravid Female (?) on bone. 'Matériaux,' sér. 2, vol. v. 1874, p. 276. fig. 72.
8. Small, rough, imperfect Statuette: in the Abbé Landesque's Collection; from Laugerie Basse. 'Materiaux,' sér. 2, vol. v. 1874, p. 287, fig. 103.
9. Attempted figure of a Human Face, cut on a piece of Reindeer Antler, from the Roche-Berthier Cave (Charente), which appears to be of "the Madelaine Period." 'Matériaux,' sér. 2, vol. vi. 1875, p. 192, figs. 75, 76.

Page 17, A. Plate V., line 7. A large "Chopper," or "Casse-tête," in black flint from La Madelaine may be specially noticed.

Page 31, B. Plate III. & IV. The variously shaped and ornamented, but always *hooked* batons, of wood, jade, &c., in use among the Chinese, and said to be given by the Emperor (?) as emblems of authority, may also be mentioned. This curved baton of power, rank, or favour, is called a "Joo-e," and is thought by some to belong to the Priesthood only.

Page 40, A. Plate XII., fig. 6. Compare the "Casse-tête," from Cro-Magnon, in 'Matériaux,' vol. v. (2e sér. vol. i.) p. 167. fig. 16.

Page 45, B. Plate V. fig. 1 &c. With reference to the dressed pebble and perforated Teeth and Shells, we may here quote the statement of a writer in the 'Geological Magazine,' vol. iii. 1866, p. 463, who refers to a dressed fossil and some bored Shells from other Cave-deposits.

"It is interesting to record that, in the cavern of Bruniquel, Dep. Tarno et Garonne, an Oolitic Belemnite, having its sides squared by grinding, was found among the *débris*; also an Ammonite and a Gryphæa, probably introduced by children as toys. Perforated recent marine Shells were likewise numerous. These latter are preserved in the British Museum"*.

Page 45, B. Plate V. fig. 2. For an example of a perforated canine tooth of Bear (?) from Laugerie Basse, see 'Matériaux,' vol. v. (2e sér. vol. i.) 1869, pl. 20. fig. 7, p. 355.

Page 50, fig. 5. This Arrow-head was from the *Tchutski* (Tschukses, p. 54) of North-east Asia, who are regarded by some as not being true Esquimaux.

Page 50, fig. 8. Originally derived from the figure in A. P. Madsen's 'Afbildninger af Danske Oldsager og Mindesmærker,' 1862.

Pages 55 and 58, B. Plate VI. figs. 10–15. See also Keller's 'Lake-dwellings' &c. (Lee's Translation), pl. 14. figs. 23–25, p. 67, used in fishing†; and a larger spindle-shaped spillet of antler, pl. 45. fig. 3, p. 151. A double-pointed specimen, somewhat like the last, is figured by E. Massenat (from Laugerie Basse) in the 'Matériaux,' vol. v. 1869, pl. 20. fig. 8, p. 355; and another, ornamented, *ibid.* pl. 21. fig. 3, p. 353. But perhaps the last has one face flat, like B. Plate XVIII. figs. 1 & 5, pp. 124, 125.

For an illustration of the double-pointed spike, lashed on obliquely at the end of a shaft, and thus supplying both point and barb, see Dupont's 'l'Homme' &c., 2me édit. 1872, p. 116. fig. 14. Such Dart-heads, consisting of an oblique spike tied on a stick, are used by the Australians (Stokes and Huxley), some South-Americans (T. K. Gay), and others, and were used in the Pile-villages of the Swiss Lakes. See Le Hon's 'L'Homme fossile' &c., 1867, p. 160. See also page 124, fig. 2.

As other analogues in form for these simple two-pointed spikes, we may mention, not only the Skewers used by Butchers, and the coarse Pins used by ancients and moderns, for fastening cloths and skins (of tents, dresses, &c.), but also the Nose-

* For an account of this Cave see 'Geol. Mag.' vol. i. p. 137, 1864; also 'Phil. Trans.' 1869, p. 501.

† Tied to the fishing-line by the centre, and wholly covered with the bait, these pins when swallowed by the fish are pulled across the gullet, and thus act as a "hook."

pins, passed through the cartilage of the nose, and worn by the inhabitants of the Marquise Islands ('Voyage de Mandane,' publiée par Charton: 'Voyageurs anciens et modernes,' vol. ix. p. 201), some Australians, and others. See page 97. A feather is sometimes thus worn: Ogle's 'Colony of Western Australia,' 8vo, London, 1839, p. 56. Near Torres Strait, Inner Passage, a Native in a canoe was seen by Mr. T. Baines to thrust his tobacco-pipe through his septum nasi, as a convenient method of carrying it; and Dr. Robert Brown has seen Vancouver Indians (who often wear nose-pendants) put their clay pipes out of the way, in the perforated septum nasi; and he informs us that the "Hioqua" shell (*Dentalium pretiosum*, Nutt.), used as money by most of the North-western Tribes, is often used as a Nose-ornament in the way described. One of the usual kinds of bone implement worn by the Australians in the nose is figured in Stokes's 'Discoveries in Australia,' 1846, pl. 1. fig. 10; and needles or awls of bone, like our fig. 1, are figured in his pl. 4. figs. 9–12.

Page 59, A. Plate XIII., line 16. *After* made *insert* partly by chipping and partly.

Page 60, line 1. *After* food, *insert* and cracking nuts.

,, ,, line 2. *After* paint, *insert* medicines,.

Page 60. *Pestles.*—The Marquis de Vibraye obtained from the Cave at d'Arcy, in a deposit referred by him to the Reindeer Period, a smooth oblong stone, 5 inches long, 3½ inches broad, and 2 inches thick, somewhat conical at one end, and slightly convex at the other and broader end, which has the appearance of having been adapted to the purposes of stamping and grinding, as a kind of Pestle or Rubber.

Page 61, A. Plate XIII., lines 1 and 2. *For* dirty-red jasper *read* clayslate stained red. See A. Plate XXIII. fig. 3, p. 109.

Page 61 (footnote), A. Plate XIII. A similar implement from Aurignac is figured in the 'Annales des Scien. Nat.' sér. 4, Zool. vol. xv. pl. 10. fig. 3.

Page 62, A. Plate XIII. The figured specimen of a stone bowl in the 'Catalogue Mus. R. Irish Acad.' p. 114. fig. 88, presents too large and deep a cavity for an analogue to our hollowed pebbles.

Page 67 (footnote), B. Plate VII. & VIII. Besides the specimen "fig. 3," the following may be added:—B. Plate II. figs. 3, 7, 8; III. & IV. figs. 1, 4, 5, 6; VII. & VIII. figs. 3, 6, 7: see page 180.

Page 68, B. Plate IX., line 11. See also 'Annales des Sc. Nat.' sér. 4, Zoologie, vol. xv. p. 253, pl. 13. fig. 7; from Massat.

Page 68, B. Plate IX., line 16. See also 'Ann. Sc. Nat.' *ibid.* p. 251, pl. 11. fig. 1;

from Aurignac. For cylindrical Dart-heads from Belgium, see Dupont's 'l'Homme' &c., 2 edit. 1872, p. 150, figs. 25, 26.

Page 70, B. Plate IX. fig. 5. The Horse's back is marked across with seven lines or shallow notches. In fig. 5, B. Plate X., p. 71, the Horses are also scored on the back, but with fewer and oblique marks; whether the lines were intended to represent hair, colour, or perspective is very uncertain.

Page 79, A. Plate XVIII. fig. 4. These round-notched flakes, adapted for scraping round sticks and stems, are noticed also by Dupont, 'L'Homme' &c., 2e édit. 1872, pp. 149 & 151. See also A. Plate XXVII. fig. 3, p. 117.

Page 85. After *Figs.* 18 *a–c* insert (fig. 10, p. 88); and after *Figs.* 19 *a–c* insert (fig. 7, p. 87).

Page 92, B. Plate XI. (see also page 70).—*Use of Shells for Ornament*:—

(1) In a Letter dated September 28, 1868, Dr. Robert Brown., F.L.S., F.R.G.S., observes:—

"Such strings of Shells as that in B. Plate XI. fig. 1 are to this day common ornaments of nearly all savage races, either as necklaces, bracelets (for wrist or ankle), or ear-pendants.

"The objects figured in B. Plate XI. figs. 2–4 look very much like nose- or ear-pendants. Savages much affect this kind of ornament, as indeed do races far from barbarous, *e.g.* the Hindoos as far as nose- and ear-ornaments are concerned, and all European and American in the matter of ear-ornaments for the women. Some of the North-American nose-pendants are of great value. On the North-west Coast they are generally made of a flat piece of the nacre of *Haliotis Nootkaensis*; and, as a piece of the required flatness is rather hard to get, large sums will be given for them. Sometimes the cartilage (septum) of the nose gets so much broken by continually putting these in and taking them out (for a savage is very proud of his nose-appendage, and will add a better one, or gamble it off, as circumstances may decide), that I have more than once seen an Indian on the Western Coast of Vancouver (in the vicinity of Nootka Sound) push his clay-pipe-stem through it so as to be out of the way when requiring to use his hands and blanket!"

(2) Mr. Alex. C. Anderson, writing from Vancouver Island, November 20, 1868, remarked:—

"The shell-relics are interesting; and I quite agree with the conclusion that they were used solely as ornaments. Among the natives of North-west America some descriptions of shell, from their rarity, have acquired a certain conventional value, but are never employed for monetary exchange like the Cowries of the East. Along the North-west Coast the shell of the *Haliotis*, procured from the south, is wrought into pendants for the ear or nose, and used also, like the mother-of-pearl when procurable, for inlaying ivory or wooden ornaments. The Hâi-a-quâ, a species of *Dentalium*, larger than the *D. entalis* or 'Sea Teeth' of Europe, was formerly highly esteemed by the Chinooks, a tribe (now nearly extinct) inhabiting the estuary of the Columbia, and continues to be prized by the inhabitants of the southern coast, and by such of the interior tribes as can procure it by barter. These shells, of dazzling whiteness, are used for personal ornaments. Among the Chinooks forty shells, strung lengthwise through their natural perforations, composed the conventional 'fathom;' and by so much as their united length exceeded the standard, so, in a rapidly increasing ratio, was their value enhanced. Among the Tâh-cully of the Upper Fraser, by whom

the shells are highly prized, this method of estimation is not observed. They plait them together in broad bandelets, and wear them as ornaments for the head or neck. The demand for these shells extends over a very large tract of country; for some years ago I noticed that my brother, the late Chief-Factor James Anderson, of the Hudson's-Bay Company, when in charge of Mackenzie's River, wrote to the Columbia for a supply for the purposes of that remote district, the natives not being able to procure a sufficiency for their wants by intermediate barter. They are procured chiefly, if not entirely, from the strait between Vancouver Island and the mainland, the natives fishing for them in deep water with baits to which the inmates of the shells adhere. The fact of their dispersion over so wide a tract of the interior, from the frontiers of California to the banks of the Mackenzie, serves to show how a rude and desultory traffic among barbarous races will account for certain articles, such as the Shells in question, being found in use in localities very remote from that in which they are naturally produced. The common varieties of Shells, such as those composing the necklace found in Cro-Magnon, I have never noticed in use: but I can readily conceive that by the ancient Cave-dwellers, living remote from the sea-shore, they were valued as rarities, and were procured, it may be presumed, by barter with adjacent tribes frequenting the coast—much as the Hâi-a-quâs now by the interior tribes of these regions."

(3) Pieces of *Dentalium*, belonging to a Necklace, were exhibited by M. de Vibraye from Tayac (Laugerie Basse) at the International Exhibition, Paris, 1867.

Page 94. *Hæmatite in the Burials at Cro-Magnon and Paviland.*—So also there was red ochre with the "Man of Mentone." This association of red paint and the corpse is vividly suggested in Schiller's "Nadowessier's Deathsong":—

> "Colours too, to paint his body,
> place within his hand,
> that in the land of souls
> ruddy he may shine."

See also Lyell's 'Antiquity of Man,' 4th edit. p. 131.

Page 95, B. Plate XII. fig. 2; and page 97, B. Plate XIII. figs. 2–6. Such lanceolate Arrow-heads, with split base, are mentioned by Dupont ('L'Homme' &c., 2 edit., 1872, p. 77) as occurring in the Cavern of Sureau, Montaigle, and as belonging to the Mammoth-period.

The notch or slit in the base of this and similar weapon-heads does not seem calculated to retain them on the stem, but to allow them to be left in the wounded animal, whilst the shaft could be regained and fitted with another head. Some savages (New Guinea &c.) in the present day prepare their arrows so that the heads may leave the stem, or break off easily at incised rings or notches; for the stems take much time and labour in preparation, and are too valuable to be lost should the prey or enemy bear them off when wounded. (T. K. Gay.)

Page 95, line 16. *For* Montéombroux *read* Monteombroux.

„ „ line 17. *For* Chatelperrou *read* Chatelperron.

Page 96, B. Plate XII. fig. 11. This curved and pointed fragment reminds one

of the curved bone-picks, pointed at each end, which the Esquimaux mount on a short wooden handle by lashing them on at the middle of their concave side, and use for digging roots. (Christy Collection: from Sir E. H. Belcher.) Its thinness and smoothness of surface, however, are against the probability of its having been so used. As for the amount of curvature in this and other implements of bone or antler, so many circumstances may have concurred to affect them, both before and after imbedding, that great caution must be had in drawing conclusions.

Page 96, line 12. *After* fastening *insert* and sewing.

„ „ line 14. *For* Tarne *read* Tarn.

Page 97, B. Plate XIII. fig. 1. It has been suggested by Dr. Broca, and with some probability, that this bears a Game-score, being a Hunter's Tally-stick. See 'Les Troglodytes de la Vézère,' 1872; and 'Nature,' March 13, 1873, p. 367. See also p. 162 and p. 189.

Page 97, B. Plate XIII. fig. 7. Possibly an Arrow-point. The groove would fit nicely to an Arrow-stem. Some South-American arrows in the Christy Collection are armed with pieces of split cane, having the point continued from the convex side. (T. K. Gay.)

Page 98, B. Plate XIII. fig. 8. Somewhat similar hollow and cylindrical Bird-bones, cut across obliquely, so as to have a point like that of a quill-pen, have been used in place of needles by the Greenlanders (as shown by specimens from old graves in Greenland), the thread having been passed along the cavity of the bone and doubled back on the outside. These sewing-implements, however, are at least $4\frac{1}{4}$ inches long, and about $\frac{1}{6}$ inch wide, being made of the long slender wing-bones of Wild Fowl. Larger hollow bones, such as the leg-bones of the Goat and other small Ruminants, cut obliquely like the specimen shown by fig. 8, have been found in Sweden, Switzerland, France, and England, and are still in use among savages (New Guinea &c.): they are of various sizes, and are well adapted for heads of spears, javelins, and arrows—the hollow butt-end being fitted on the shaft either with or without a traversing peg, for which a hole sometimes remains. Mr. John Evans, F.R.S., has one of these bone weapon-heads, from the Cambridge Fens; it is hollow at the butt-end, with a hole for a pin or rivet. Such a spear-head is figured in pl. 4. fig. 68, of Nilsson's 'Primitive Inhabitants of Scandinavia,' Lubbock's Edition, 8vo, 1866. See also Keller's 'Lake-dwellings,' &c., Lee's Translation, pl. 3. fig. 15, and pl. 20. fig. 22; these latter, however, retain the knuckle-end of the bone.

The specimen illustrated by fig. 8 seems well calculated for an Arrow-point. It is like the tips of some New-Guinea arrows in the Christy Collection. The Bush-

men use sometimes a bone and sometimes a quill for the points of their Arrows. (T. K. Gay.)

Page 99, B. Plate XIII. fig. 14. A Scraper or Scratcher made of two Beaver's teeth, from Alaska, and some Esquimaux Scrapers made of Birds' Claws, in the Christy Collection, remind us that this claw-like implement may have formed part of such a scraping, tearing, or carding implement as those alluded to.

A similar hooked, claw-like point, but perforated, is figured in Lee's Keller's 'Lake-dwellings,' pl. 5. fig. 16, p. 34. Beavers' incisors are used by North-American Indians for scraping the flesh from hides in the process of tanning; 'Canad. Journ. Indust. Sc. Art.' n. s. vol. v. p. 417, 1860. See also Lee's Keller's 'Lake-dwellings,' pl. 28. figs. 8, 16, 17 (the "comb" and two curved pointed "needles").

Page 102, B. Plate XV. & XVI. With regard to the ornamental clubs, "Batons," "Commandostäbe," or "Pogamagans," here treated of, further observations will be found at pp. 300 and 180.

A piece of forked antler, perforated at the middle of the cross, at the junction of beam and brow, is figured and described by M. Lartet in the 'Annales des Sciences Naturelles,' sér. 4, vol. xv. p. 250, pl. 10. fig. 5; but M. Lartet satisfied himself that the specimen (from Aurignac) is quite different in the character of its perforation from those mentioned in the text.

Page 102, line 20. One fragment of a *barbed* Harpoon marked as having come from the Gorge d'Enfer is in the Christy Collection; but M. Lartet regarded it as having been wrongly labelled.

Page 103, B. Plate XV. & XVI. fig. 1. This is regarded as an ornamental Tally-stick, with a Score marked on its edge, at page 189.

Pages 122, 123, 126, B. Plate XVII. figs. 5, 22, & 25, and B. Plate XVIII. fig. 6. Though differing much in size, yet these may be fragments of such *bows* as are used in working drills, making fire, and other purposes by the Esquimaux.

Page 124, B. Plate XVIII. fig. 1. The ornament on the flat face (not figured) here referred to is like that on fig. 73, 'Matériaux,' 1873, p. 396, a similar specimen from Laugerie Basse.

Page 134, fig. 24. In Nilsson's 'Stone Age' (Lubbock's Edition) a stone knife of very similar shape is represented, pl. 5. figs. 84, 85. See also Evans's 'Stone Implements,' p. 264.

Page 137, A. Plate XXXIII. fig. 4. The Implements of semicircular shape are figured also in Lee's Keller's 'Lake-dwellings,' pl. 28. fig. 32, p. 99; and Lubbock's Nilsson's 'Stone Age,' pl. 5, figs. 86–91, pp. 86–91. See also Evans's 'Stone Implements,' p. 267.

Page 139. A nodule of *Pyrites*, used as a Briquet by the Cave-folk, is referred to by Dupont, 'L'Homme' &c., 2nd edit. 1872, p. 153, fig. 29. See also above, p. 251, no. 32.

Pages 142 and 143, B. Plate XIX. & XX. fig. 1. The *long-eared* figure of a Horse. It is suggested by M. de Mortillet in the 'Matériaux,' vol. iii. 1867, p. 210, that there might have been a race of Horses having long ears.

Page 145, line 11. *For* terete-pointed *read* terete, pointed.

Page 159, B. Plate XXIV. figs. 1 and 3. Perhaps the pitted figures were intended to represent *dappled* Deer, or rather Fawns of Red Deer, which are always somewhat dappled.

Page 160, B. Plate XXIV. fig. 5. The figures were probably intended for some kind of *Waterfowl*.

Page 160, B. Plate XXIV. fig. 7. This figure has a decidedly *Asinine* aspect, both as to the head and tail; and so has the figure on the reverse, but not so strikingly.

Page 161, fig. 31. This barbed Lance came probably from the Gambier Islands, Low Archipelago. See Beechey's 'Voyage to the Pacific,' London, 1831, p. 143.

Page 161, line last but one. *For* Society Islands, *read* Gambier Islands.

Page 172, line 7. *After* 120, *insert* 136,.

Page 180, B. Plate XXX. & XXXI. *Pogamagans.*—Besides those mentioned in the text, there are some other Pogamagans figured in the 'Matériaux,' and elsewhere, from Caves of the Reindeer Period:—

1. In the 'Matériaux,' sér. 2, vol. iv. 1873, p. 352, pl. 22. figs. 1, 3, and 4 represent two "Batons" of antler, from Veyrier, Savoy, and of the Reindeer Period. Fig. 1 has a single central hole in the slightly dressed butt, and belongs probably to the Arrow-straighteners; the other (figs. 3 and 4) had a relatively large perforation, but is broken. Both bear obscure outlines and other marks.
2. In the same volume, p. 446, figs. 77 and 78 represent an imperfect Baton (from the Arudi Cave, in the Pyrenees), with its butt cut down to a *ring* (broken), with two associated carvings of half-faces of a horned and bearded Goat-like animal. On one side the horn projects, with a slight curve, on the stem; and on the other the head is reversed and has its horn curved outwards and downwards by the jowl, like that of a Musk-ox. From the mouth extends a long line, with numerous short lateral lines, either single and oblique, or in pairs and at right angles to the median line.
3. In the 'Matériaux,' sér. 2, vol. v. 1874, p. 288, fig. 104, a woodcut is given of a sculptured "Baton" of Reindeer horn, having the butt shaped into a distant resemblance of a head of Bird, Snake, or Fish, and the stem somewhat attenuated and marked with groups of lines, straight, oblique, and zigzag, which possibly may have been the symbol for water. It is from Laugerie Basse (the Abbé Landesque's Collection). This implement, having the perforation single, and central in the fashioned butt, may have been an Arrow-straightener rather than a Pogamagan.
4. Similar Implements of antler were found in the Kesslerloch, near Thäingen; 'Mittheilungen antiquar.

Gesellschaft in Zürich,' vol. xix. pl. 3. fig. 17 (broken), pl. 4. fig. 41, and pl. 7. fig. 63. These all seem to have had only a single central perforation in the butt, which is merely truncate in fig. 63, and somewhat shaped, but irregularly, in fig. 41, pl. 4. Hence these also come into the category of Arrow-straighteners; but, like others, they would serve as Pogamagans, or Clubs to kill game with. The Esquimaux have such clubs (not ornamented), both large and small, for killing Seals (Christy Collection, from Sir E. Belcher and others). Their well-known Arrow-straighteners are of bone, shorter and more equal-sided than our perforated antler-tools, and they have the hole cut obliquely from face to face—an adaptation to the intended purpose not evident in the ancient implements under notice, though sometimes the hole is slightly oblique. Small Pogamagans were found also at Bruniquel (British Museum); and one of them has a subrhomboidal ornamented butt with central perforation, thus corresponding closely with the specimen from Salève (Haute Savoie), discovered by M. Thiolly, and generally with those mentioned above, and with the specimens from the Goyet Cave (Dupont).

Page 180, line 11. *After* Bear *add* (Hippopotamus ?).

Page 181, B. Plate XXX. & XXXI. Although the majority of figures of Horses from the Caves seem to be *big-headed*, yet there are some with *small heads* and *high crests* or much-arched necks. Thus a small-headed and high-crested Horse, in an attitude of surprise, is shown in fig. 4, pl. 20, 'Matériaux,' sér. 2, vol. i. p. 354, from Laugerie Basse, in M. E. Massenat's Collection; and another, from the same place, in 'Matériaux,' sér. 2, vol. v. 1874, p. 276, fig. 73, in the Abbé Landesque's Collection.

We may remark also that of the two engraved outlines of Horses found in the Kesslerloch at Thäingen (Schaffhausen) and figured in pl. 7, 'Mittheilung. antiq. Gesellsch. in Zürich,' vol. xix. part 1, one (fig. 65) is certainly small-headed, with large barrel, and a long, thin, hairless tail (!); whilst the other (fig. 63), on a Pogamagan, has a strikingly protuberant muzzle, though its head does not appear very large for the body, which is somewhat disproportioned in length. The latter Horse has a shaggy jowl. The former (fig. 65) has somewhat the aspect of a Mule (!). If these be taken as evidence of different varieties of Horse, the *Asinine* figure in our B. Plate XXIV. fig. 7, may really be another form, and the long-eared variety, before mentioned, may also have existed.

Page 183, line 10 from the bottom. Of the Flaying, Flenshing, Flensing, or Flinching Tool *read* thus:—In this, one edge is made to fit the hand, by a roll of root-fibres and split rootlets, passed to and fro through holes in the slate near the margin, and enveloping some little bundles of the same, set straight and parallel; the whole intermixed with a brownish cement.

III.—PART III. MISCELLANEOUS: ART ETC.

(1) *Possible Variations in Form of Implements.*—In a Letter dated September 28, 1868, Dr. Robert Brown, F.L.S., F.R.G.S., remarks:—

"A savage is capable of improving his implements, even though his house, his dress, and his customs remain unaltered. In Greenland you find, in the old graves, the harpoon-holder with a *hole* for the thumb, instead of, as now, only a *depression on the edge*; and when civilization first reached them they had adopted this improvement, showing that it was the effect of an idea not introduced from foreign sources, but wrought out by themselves. This is of some importance, as it shows that a savage is capable of a certain degree of improvement from *within*, though the generally accepted theory is that the impulse must come from *without*. If, therefore, you should find among the Cave-men's tools some which seem improvements upon those of a preceding age, we must not hastily conclude that they belong to a different people.

"A people may go back in civilization; and the rude tools found need not have been the first efforts of a people, nor the more polished ones the later. Some months ago, when in the Museum of Ethnology at Copenhagen, the eminent Conservator, Kammerherre Carl Steinhauer, pointed out to me a beautifully formed Chinese musical instrument, and another from Borneo, rudely made after the same design. The Chinese who emigrated to Borneo had fallen back in civilization, but still retained the remembrance of an art practised in their mother country, though without the skill to fashion an instrument as beautiful as the original; and the rude instrument shown me was the result of this. Now, if it had been found in tombs, or in a place where no history attached to it, we should have said that it was the first effort of a savage race, and that the other was the advanced work: on the contrary, the rude instrument dates after the finished, being the result of a retrograde civilization"*.

(2) *Art of the Cave-folk of Périgord.*—In the 'Proceedings of the Literary and Philosophical Society of Manchester,' vol. xiv. no. 10, 1875, pp. 113–116, Mr. ARTHUR W. WATERS, F.G.S., reviews Prof. ALBERT HEIM's Memoir on the Contents of the Kesslerloch at Thäingen, near Schaffhausen, and says (p. 116):—

"Prof. Heim also argues that the preponderance of animals [in the engraved figures illustrated in LARTET and CHRISTY's 'RELIQUIÆ AQUITANICÆ'] looking to the left over those looking to the right indicates a probability that the artists drew with the right hand. He concludes by saying, 'the race of zoo-artists were in their talents in advance of the means which were at their disposal. In the late races (for example, the Pile-dwellers) the intellectual capacity and the resources in the midst of which the men grew up are more nearly balanced.' He also says 'that this was a premature attempt of the human genius, and that no partial inconsistent cultivation of a single talent can be maintained for a long period.' This last remark does not seem to be borne out, since the similarity of the Esquimaux and Palæolithic Man is undoubted, and would rather make us consider how persistent a low civilization may remain when there are few extraneous modifying circumstances."

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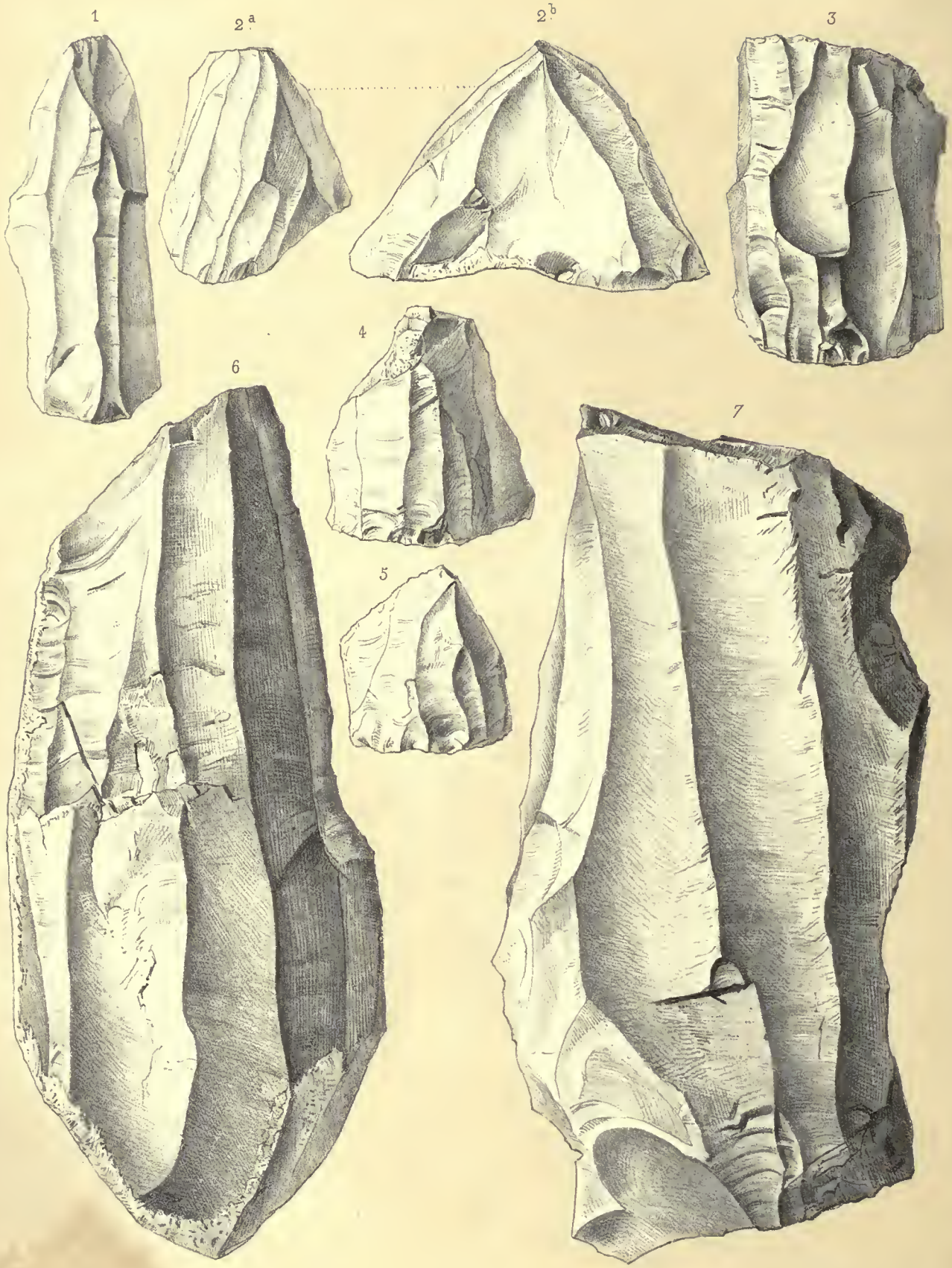
* Thus giving rise to one class of "survivals."—EDITOR.

DESCRIPTIONS OF THE PLATES.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. I.



Louveau del. et lith.

Imp. Becquet à Paris.

DESCRIPTIONS OF THE PLATES.

A. STONE IMPLEMENTS.

A. PLATE I.

These are blocks of Flint from which narrow flakes have been struck off, by a succession of carefully directed blows; so that the piece remaining bears several narrow facets, and may be regarded as the nucleus or core from which numerous blade-like pieces have been removed by blows of another stone or a hammer.

Fig. 1. Small oblong Core of grey flint, whitened on surface, and containing *Orbitoides*. From it, on the side shown, five or six flakes have been struck. The two broadest facets bear, at the bottom of the figure, the depressions due to the "bulb of percussion."

Laugerie Basse.

Figs. 2 *a*, 2 *b*. Conical Core, oblong at base, formed of whitish-grey flint, with surface-change, and shaped by the removal of fourteen or fifteen flakes. 2 *a*. End-view, presenting the hoof-like form which the kind of flaking here shown produces. 2 *b*. Side-view.

Les Eyzies.

Fig. 3. Core of dark-grey flint, oblong in form, truncated at the ends; bearing on one side traces of ten or twelve detachments, and retaining on the other the weather-worn crust of the original flint-block.

Laugerie Haute.

Fig. 4. Rough Core of dark-grey flint, surface-changed; forming a cone, from which six perfect and many irregular flakes have been struck.
Les Eyzies.

Fig. 5. Irregular Core of surface-changed dark flint; bearing numerous facets, and here and there incrusted with the calcareous cement of the Bone-breccia.
Les Eyzies.

Fig. 6. Unusually large Core of light-brown flint, formed from an oval nodule, and retaining the yellow-brown crust, except where the fractured ends and side and nine or ten facets expose the interior.
Laugerie Basse.

Fig. 7. Very large Core, truncated at each end, roughly broken on one side, and showing on the figured side six or seven facets. The whole surface is much altered (dirty white), possibly by the action of fire.
Les Eyzies.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	70	2·756	25	0·984	19	0·748
3.	40	1·575	65	2·559	32	1·260
3.	68	2·677	40	1·575	20	0·787
4.	40	1·575	40	1·575	35	1·378
5.	32	1·260	35	1·378	30	1·181
6.	160	6·299	65	2·559	60	2·362
7.	150	5·906	80	3·150	50	1·968

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. II.

Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE II.

This Plate illustrates a series of "flakes" of Flint, mostly of small size, and many of which have sharp points for piercing or fine-cutting. They all show more or less the discoloration and glazing due to the action of water and the atmosphere.

Laugerie Basse.

Fig. 1. Very small, flattish, slightly arched, sharp at the point and edges. Dark-coloured flint.
Laugerie Basse.

Fig. 2. Small, long, slightly curved, irregularly triangular; apparently notched by use on one edge at the lower end of the figure. Dark flint.
Laugerie Basse.

Fig. 3. Honey-coloured; slightly arched in form, small in size, with an unusual number of minute regular facets on the outer surface.
Laugerie Basse.

Fig. 4. Brown; similar to the last, but not so perfect, the bulb-end having been broken off.
Laugerie Basse.

Fig. 5. Dark-coloured; one-sided, with oblique fracture of detachment; tapered to a fine point, with sharp edges.
Laugerie Basse.

Fig. 6. Grey; thin, narrow, and delicate in form, nearly flat; suddenly curving at extremity.
Laugerie Basse.

Fig. 7. Grey, thick, three-faced, arched; possibly used as a drill.
Laugerie Basse.

Fig. 8. Yellow; straight, three-faced, bayonet-like; broken at the ends.
Les Eyzies.

Fig. 9. Small, delicate, white (surface-changed), slightly arched; the straighter edge minutely chipped.
Laugerie Basse.

Fig. 10. Very similar to Fig. 2 of this Plate, but smaller and less curved; minutely chipped along one edge.
Laugerie Basse.

Fig. 11. Dark grey; flattish; like Fig. 1, but larger.
Laugerie Basse.

Fig. 12. Very small bayonet-like flake of dark flint.
Laugerie Basse.

Fig. 13. Yellow; very much smaller; much like Fig. 1, but shorter and broader.
Laugerie Basse.

Fig. 14. Cream-coloured, surface-changed, thick-ridged; pointed at the narrow end by lateral fractures, making a sharp edge.
Les Eyzies.

Fig. 15. Brown-grey, surface-changed; larger and flatter than Fig. 14, but pointed in a similar manner.
Les Eyzies.

Fig. 16. Dark-coloured; arched and sharp-edged; much more pointed than the two preceding, but tapered by similar lateral fractures at the thick end.
Laugerie Basse.

Fig. 17. Honey-coloured; large, three-faced, nearly straight, razor-shaped.
Laugerie Basse.

Fig. 18. Simple flake of grey flint, knife-shaped, sharp at the edges and points.
Laugerie Basse.

Fig. 19. Brown, narrow, slightly arched, sharp at the edges; suddenly narrower at the further end, with a shoulder.
Laugerie Basse.

Fig. 20. Like Fig. 2, but sharp at one end.
Laugerie Basse.

Fig. 21. Small, subtriangular flake of light-brown flint; slightly roughened at both sides, probably by use.
Laugerie Basse.

Fig. 22. Dark-grey, long, narrow, arched, triangular; blunt at each end.
Laugerie Basse.

Fig. 23. Simple acute-lanceolate flake of dark flint.
Laugerie Basse.

Fig. 24. Like Fig. 14, but larger and buff-coloured.
Les Eyzies.

Fig. 25. Honey-coloured; narrow, lanceolate, slightly arched; edges partly roughened, probably by use.
Laugerie Basse.

Fig. 26. Simple, knife-like flake of dark flint, somewhat irregular in outline.
Laugerie Basse.

Fig. 27. Long, narrow, curved, slightly arched, knife-like flake of brown flint.
Laugerie Basse.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	22	0·865	4	0·157	2	0·078
2.	42	1·653	4	0·157	4	0·078
3.	52	1·976	9	0·354	4	0·157
4.	50	1·968	8	0·315	2	0·078
5.	50	1·968	13	0·512	3	0·118
6.	58	2·283	6	0·236	2	0·078
7.	65	2·559	11	0·433	5	0·197
8.	53	2·086	7	0·275	3	0·118
9.	42	1·653	5	0·197	2	0·078
10.	40	1·575	4	0·157	4	0·157
11.	32	1·260	5	0·197	2	0·078
12.	22	0·865	3	0·118	2	0·078
13.	21	0·826	5	0·197	3	0·118
14.	48	1·889	10	0·393	5	0·197
15.	59	2·322	15	0·590	5	0·197
16.	62	2·440	9	0·354	3	0·118
17.	132	5·196	25	0·984	7	0·275
18.	56	2·330	12	0·472	3	0·118
19.	47	1·850	7	0·275	2	0·078
20.	44	1·732	4	0·157	4	0·157
21.	23	0·905	7	0·275	3	0·118
22.	58	2·282	8	0·315	3	0·118
23.	64	2·519	13	0·512	3	0·118
24.	85	3·346	15	0·590	7	0·275
25.	79	3·110	16	0·630	4	0·157
26.	60	2·362	14	0·551	3	0·118
27.	70	2·756	10	0·393	3	0·118

A. PLATE III.

Figs. 1 *a*, 1 *b*, 1 *c*. Large broad flake, worked into a lanceolate form by careful chipping along the edges of the outer face.

Dark-grey flint, slightly glazed. Lightly weathered by surface-change on the face 1 *b*.

Le Moustier.

	French millimetres.	English inches.
Length	122	4·802
Breadth	60	2·362
Thickness	18	0·709

Figs. 2 *a*, 2 *b*, 2 *c*. Implement of ovato-lanceolate form, almost equally convex on each face; the narrow or pointed end considerably thinner than the broad end or butt.

This specimen has been roughly chipped from the solid, and then more carefully worked on the edges of the pointed end,—thus resembling some of the old worked flints from the Valley of the Somme.

A small portion of the original crust of the flint is left on the outer curve of Fig. 2 *b*.

Dark-grey flint, slightly glazed.

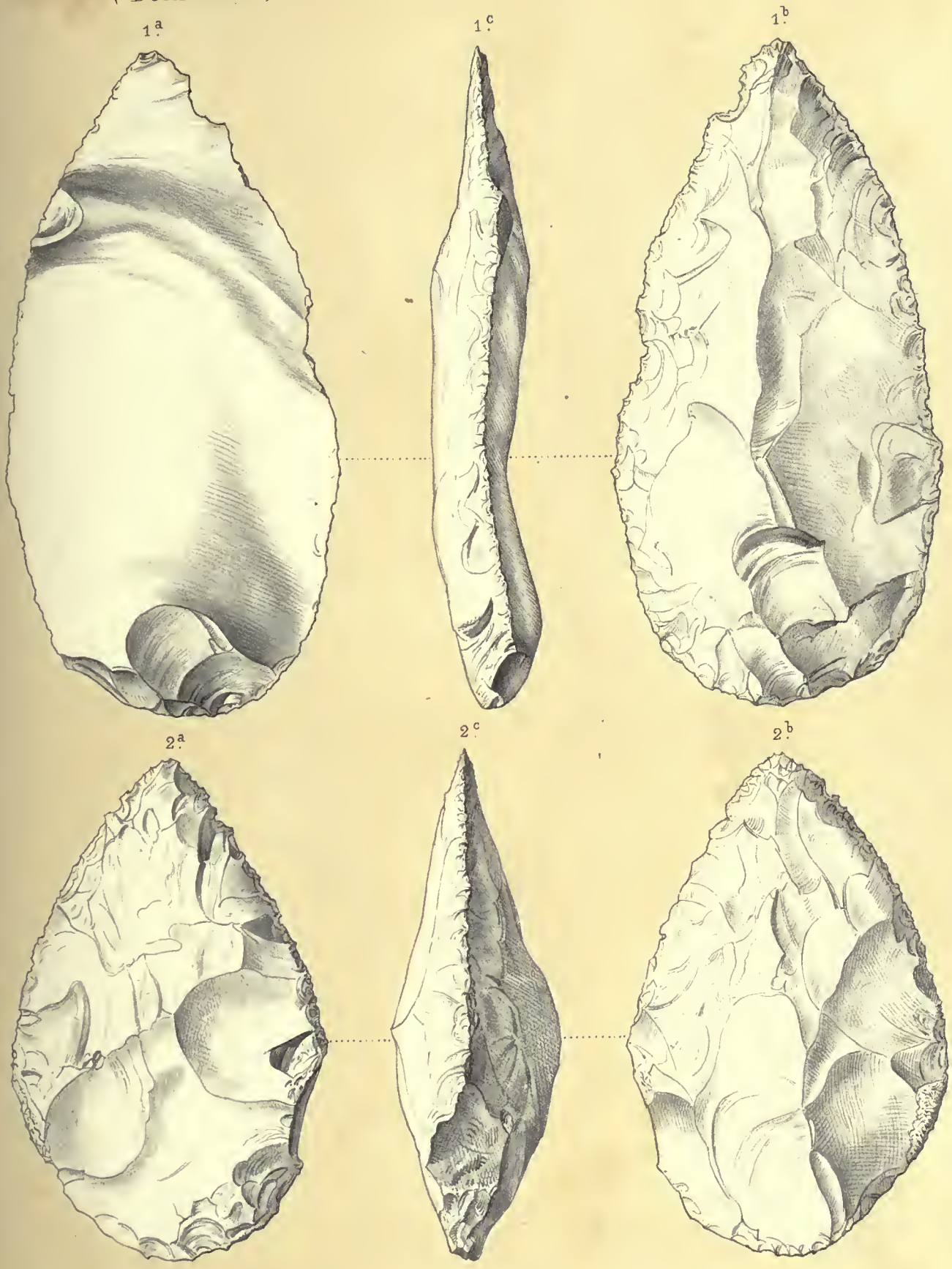
Le Moustier.

	French millimetres.	English inches.
Length	90	3·543
Breadth	57	2·244
Thickness	30	1·181

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. III.



Louveau del. et lith.

Imp. Becquet à Paris.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. IV.

Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE IV.

The specimens figured in this Plate are lanceolate pieces of Flint, carefully shaped by repeated chippings into a flattish, long, acute-ovate form, with pointed ends and somewhat sharp edges. They are all from Laugerie Haute. The resemblance between these neatly made flint implements and some found in Denmark is very remarkable; hence these much-chipped and symmetrical forms are sometimes spoken of as belonging to the "Scandinavian Type."

Fig. 1. Light-grey; glazed.
Laugerie Haute.

Fig. 2. Dark-grey; glazed.
Laugerie Haute.

Fig. 3. Chalcedonic flint, somewhat weathered; one end broader than the other.
Laugerie Haute.

Fig. 4. Darkish-grey; much weathered and mottled, chiefly on one face. More oval than the others.
Laugerie Haute.

Fig. 5. Narrow, neat, highly finished, nearly smooth; broadest at its lowest third; mottled light and dark brown; glazed.
Laugerie Haute.

Fig. 6. Small, retaining curve of the original flake from which it has been worked; grey, slightly glazed.
Laugerie Haute.

Fig. 7. Fragment, retaining the face of the original flake on one side; dark grey, glazed and weathered, showing fine grey mottling, especially on the convex face.
Laugerie Haute.

Fig. 8. Fragment. Worked on both faces; grey; glazed.
Laugerie Haute.

Fig. 9. Fragment. Dark-grey, coarse flint; glazed.
Laugerie Haute.

Fig. 10. Small; somewhat irregular in outline; grey; glazed.
Laugerie Haute.

Fig. 11. Long and narrow, symmetrical, broadest towards one end; light-grey flint, much weathered, freely flecked with white, and the edges white and opake.
Laugerie Haute.

Fig. 12. Long, narrow, less regularly lanceolate than the others, tapering nearly equally at the two ends; one side formed of the original face of the flake. Brownish-grey flint, highly glazed, and much whitened by weathering, especially on the flat face.
Laugerie Haute.

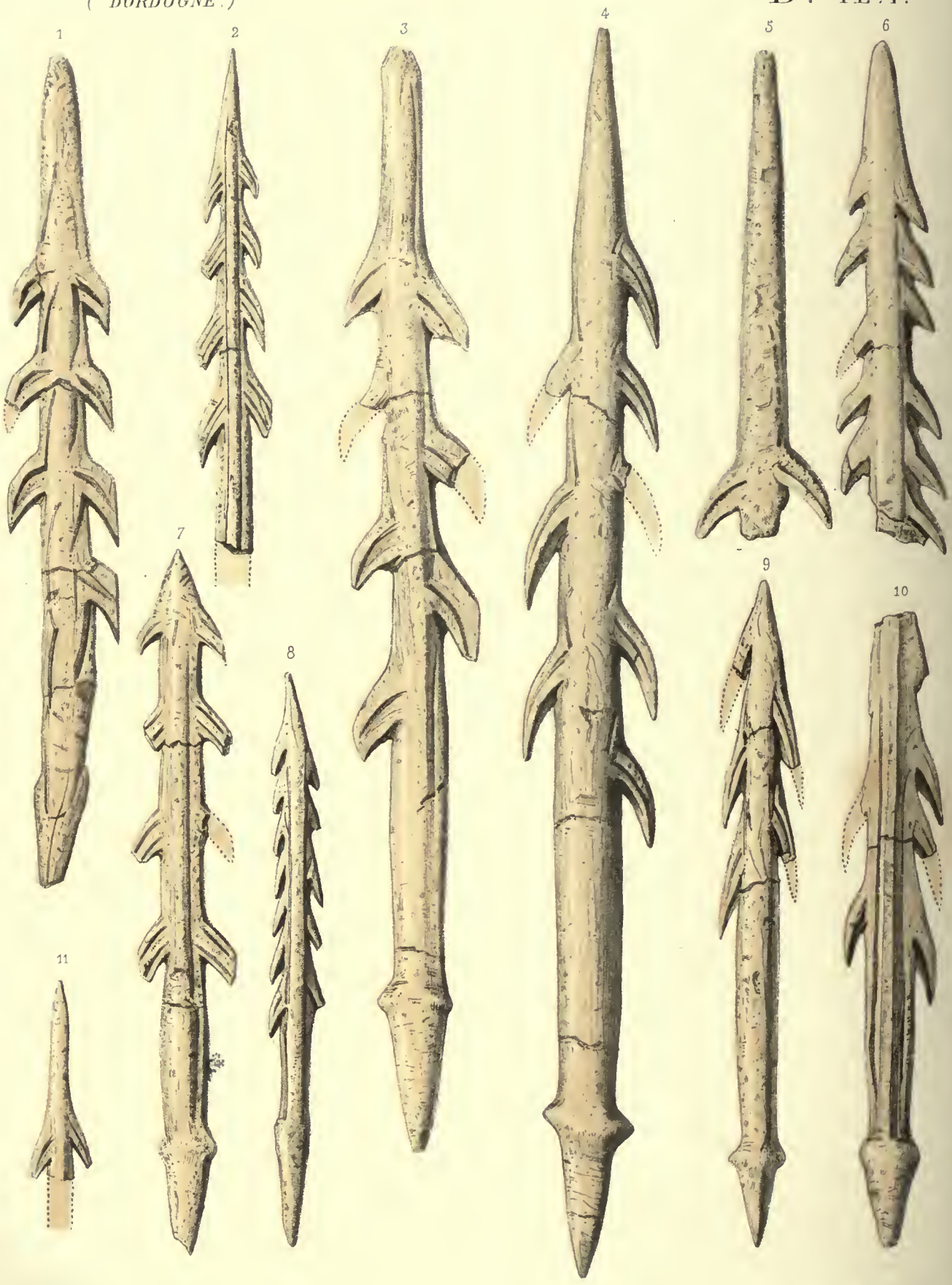
Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	58	2·282	19	0·748	5	0·197
2.	64	2·519	18	0·709	5	0·197
3.	99	3·898	22	0·865	5	0·197
4.	55	2·165	22	0·865	6	0·236
5.	54	2·126	14	0·551	4	0·157
6.	47	1·850	14	0·551	4	0·157
7.	(73) 116	(2·9) 4·597	25	0·984	6	0·236
8.	(72) 122	(2·8) 4·802	35	1·378	6	0·236
9.	(57) 96	(2·2) 3·779	22	0·865	5	0·197
10.	39	1·535	15	0·590	4	0·157
11.	75	2·953	17	0·669	4	0·157
12.	70	2·756	16	0·630	5	0·197

Note.—Figs. 7, 8, and 9 being fragments, the measurements in brackets give the actual length of the pieces, and the estimated length of the specimens when perfect is placed in the column for comparison with that of others.

RELIQUIÆ AQUITANICÆ.

(*DORDOGNE.*)

B. PL. I.



Louveau del. et lith.

Imp. Becquet à Paris.

B. BONE IMPLEMENTS, &c.

B. PLATE I.

The specimens figured in this Plate belong to the Category of Arms, or, perhaps, of Fishing-Implements, made of Reindeer's Horn. Whether considering them as Arrow-heads, or as Harpoon-heads, we see that all, both large and small, have on each side recurved points, hooks, or barbs, cut out of the sides, and sometimes opposite, sometimes alternate. The upper end, more or less elongated and pointed, is sometimes rounded and nearly smooth. One would scarcely think that weapons of so little sharpness could pierce the flesh of animals, even that of fishes, had we not known that the Esquimaux of our own day (particularly those of the more northern regions, who have not yet been able to get any iron) are obliged to make their tools and weapons of bits of wild Reindeer Horn, and that these are not the less formidable to wild beasts *.

All the Weapon-heads are tapered, and even pointed, at the lower end or butt, without doubt to fit into a socket in the end of a wooden shaft. Two or three lines distant above this tapering butt-end there are nearly always two little eminences or knobs, probably to aid in fixing the implement in the shaft, unless, indeed, it was for the fastening of a line for attachment †.

* In his 'Polar Regions' (8vo. Edinburgh, 1861) Sir J. Richardson remarks, p. 308, "A strong arm is required, as well as much address to bend an Eskimo bow. In the hands of a native hunter, it will propel an arrow with sufficient force to pierce the heart of a Musk-ox, or break the leg of a Reindeer. Iron obtained by barter, or from wrecks, is employed to point weapons, or to make flenching knives; but among the *Kittegarëut* native copper is extensively used for the purpose, and for making ice-chisels. The more northern Eskimos are compelled to resort to the antlers of the Deer for the construction of the indispensable ice-chisels. Flint or chert, obtained from the Silurian limestone, is chipped to make arrowheads, precisely similar to the flint weapons so commonly found in the soil of various parts of Europe, and even now frequently fashioned by the natives of Australia. The nature of this material has caused the form of the weapons to be alike in all these distant localities." And at p. 307 he says, "Strong cord is made from strips of Seal-skin hide; and the sinews of Musk-oxen and Deer furnish bow-strings, or cord to make nets or snares."

† Sir J. Richardson states (Polar Regions, 1861, p. 309), "The harpoons and lances used in killing Whales and Seals have long shafts of wood or of Narwhal's tooth; and the barbed point is so constructed that, when the blow takes effect, it is left sticking in the body of the animal, while the shaft attached to it by a string is disengaged from the socket, and becomes a buoy of wood."

Perhaps with these harpoons, much smaller in size than those of the Esquimaux, our old fishermen of Périgord attacked the large freshwater Fishes which abounded in their rivers*; and perhaps, also, the shaft, detached from the harpoon, served as a float to indicate where the fish went, and to check its retreat.

There are also heads for arrows or harpoons which have barbs down one side only; and it is difficult to suppose them to be anything but fishing-implements. These we shall figure on another Plate.

In most of these barbed weapon-heads there are long nicks or grooves on the barbs, and almost always on both sides. These grooves are most frequently simple; but sometimes they are double; and they follow the curve of the barbs, which sometimes end in a sharp hook, and sometimes with a nearly smooth point. It has been conjectured, in searching for an explanation of the probable use of these grooves, that they may have served to hold a poisonous substance, active enough to hasten the death of the wounded animal. In support of this supposition, one may refer to the custom that some of the savages of South America have of rubbing the arrows used in hunting with a poison that makes the flesh of the animals so killed more tender. An historian of the eighteenth century (Dom. Martin, Hist. des Gauloises) has held that the Ancient Gauls had just such a practice in the chase†.

Fig. 1. A Head of an Arrow or Harpoon, with barbs on each side. It belongs to the *Long-pointed* type, with a round and nearly smooth point. It has eight barbs, one of which has been broken; they are arranged on the two sides, one opposite to another, that is to say, opposed, and not alternate as we shall see them in other specimens; they are flat, and their points are sharply curved back or hooked, and hollowed on each face by grooves or nicks, intended, perhaps, to lodge poison in. The stem of the weapon also bears longitudinal grooves, disposed two and two on the intervals between the barbs. This weapon is made of Reindeer horn, like all the others.

From La Madelaine.

Fig. 2. Another Harpoon-head, with the apex carefully pointed; it bears eight

* It was not very long ago, that is, before the building of certain weirs on the Dordogne River, that Salmon came up from the sea as far as the Vezère, which still produces abundantly Carp, Barbel, and other Cyprinoid Fish.

† Barbed weapons, somewhat similar to those described above, and bearing poison-grooves, have been found in the Lower Cavern at Massat, Languedoc, by M. A. Fontan (see 'Quarterly Journal of the Geological Society of London,' vol. xvii. p. 470).

barbs, subalternate, those on one side rising a little above those on the other. These barbs are not so long as those in Fig. 1, and lie nearer to the stem, which throughout its length has a raised riblet, running up into the point, and bordered all along by engraved lines or continued notches. The barbs in this specimen have double grooves. This is one of the most carefully worked; but it is imperfect, owing to an old fracture just below the barbed portion.

From Laugerie Basse.

Fig. 3. This is of the *Long-pointed* type, but not very sharp; it has seven barbs—three on one side, and four on the other; and the stem is marked with large shallow furrows. This specimen differs somewhat in form from most of the weapons of this kind.

From La Madelaine.

Fig. 4. Another Harpoon-head, more carefully worked than the last. It is one of the largest we have found. Its point is elongate and somewhat sharp. The stem is regularly rounded. The barbs, cut out symmetrically, and marked with simple grooves, are three on one side (right), and five on the other (left); the first on the left side is placed forward, and has none to correspond with it on the other side. The others are some alternate, some opposite. There are no longitudinal lines, but only oblique notches between each two barbs. The knobs at the haft are very prominent.

From La Madelaine.

Fig. 5. A Fragment, broken off below the first pair of barbs. The point is very much drawn out, rounded, and smooth at its extremity. The barbs have simple grooves. This is a form very distinct from those ordinarily met with.

From La Madelaine.

Fig. 6. With numerous barbs; these are closely set, rounded, and offering no trace of the supposed poison-grooves. Though broken through the barbed portion, this specimen still presents seven barbs on one side and eight on the other.

From La Madelaine.

Fig. 7. A distinct type*, with the point forming a triangle by the meeting of the first two barbs, which, like the others, are nearly flat, and are hollowed by two

* Unless, indeed, it was originally longer, and has been re-cut and sharpened after having been broken.

parallel grooves on both faces. The stem is marked by two longitudinal lines, between which is a somewhat raised fillet, dying out at the point. The knobs for the haft are tolerably prominent.

From La Madelaine.

Fig. 8. With a sharp point and numerous barbs; these lie almost close to the stem, and are subalternate, seven on one side and five on the other, mostly without poison-grooves. The stem is marked by a continuous fillet along one side, and an interrupted fillet on the other.

From La Madelaine.

Fig. 9. Another Harpoon-head, sharply pointed, and very short. The barbs are long, curved along the stem, and simply grooved, three on one side and two on the other. The haft-knobs are prominent; the lower or butt end is very much pointed.

From La Madelaine.

Fig. 10. Harpoon-head of particular form, bearing along its middle a longitudinal and highly raised rib. The point is broken off. The barbs diverge slightly, are subalternate, and oblique to the axis of the stem, four on one side and three on the other.

From La Madelaine.

Fig. 11. A small specimen, with elongate point, and belonging to the same type as Fig. 5. It has been broken below the first pair of barbs, which are subalternate.

From La Madelaine.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. II.

Louveau del. et lith.

Imp Becquet à Paris.

B. PLATE II.

Fig. 1. A cylindrical piece of Reindeer Horn, on which are carved two outlines of Fishes, one on each side. In the figure here given, the form of the head, the shape of the gills, an obscure indication of the back-fin, and the proportions and general appearance permit us to refer this Fish to one of the freshwater kind, probably of the Cyprinoid (Carp) family.

The fragment is broken at both ends; and we can scarcely form an opinion as to its original use, and whether, indeed, it was an ornament or not*.

From La Madelaine.

Fig. 2. This is a piece of Bird's Bone, broken at both ends by old fractures; and the absence of an articular extremity makes it very difficult to attribute a specific relation for this bone. Nevertheless, in spite of its broken and worn condition, we may recognize the upper part of a cubitus of a very large Palmipede, probably a Swan. On it is engraved the incomplete figure of a four-footed Mammal standing still. By the old fracture of the fore part the head has been lost; but what remains of the shoulder, rising towards the withers, which join by a slight incurving the line of the back, that ends in a short tail, enables us to recognize the Reindeer, so often represented by the aborigines of Périgord. The four legs, but not their extremities, are shown. Hatchings or indications of hair under the line of the back, at the beginning of the limbs, and below the ribs, have given a kind of relief to the drawing. It is not apparent for what intention this figure has been surcharged with a longitudinal series of chevrons or zigzag lines from shoulder to haunch. The figure is in other respects boldly drawn, and the contours vigorously rendered.

This specimen, the use of which it seems impossible to indicate, was found at La Madelaine.

Fig. 3. This is also a fragment, broken at the ends, and showing at one of them the broken rim of a hole intended either for hanging it up by, or for some other use. The material is Stag's Horn†; and the animal which we find represented

* Similarly engraved pieces of bone, bearing figures of Fishes, are worn (we are told by Mr. Francis Poole) by some of the Indians of North-west America as charms, when sailing across Queen Charlotte's Sound.

† It is remarkable that the old Savage, who wished to represent a Stag, has judiciously chosen for the material an antler of *Cervus elaphus*; whilst among the thousands of fragments of Reindeer Horn which we have collected in the Dordogne Caves we have found scarcely a fragment of Stag Horn.

on it is certainly a Ruminant with complex antlers. The animal is squatting*, having the legs folded under the body. The form of the head, with the mouth open†, is not sufficiently characteristic for determining the species; but the disposition of the antlers is certainly that of the Common Stag (*Cervus elaphus*), bearing a chief branch, surmounted by a smaller one, and followed by the middle branch. We may see, moreover, behind, the commencement of the top-branching. The shoulder, slimmer than in the Reindeer, bears two rows of hatchings or marks for hair; and we see others on the forehead, and some patches of lines thrown in here and there on the body, probably to give relief to the drawing.

On the opposite face of this specimen, which we thought to be too difficult to figure, we find confusedly intermixed several engravings, amongst which, however, we can distinguish the leg and foot of a Horse, sufficiently well designed.

From La Madelaine.

Fig. 4. A very thin slice of Reindeer Horn, broken on several sides, and on which is the figure of an animal somewhat difficult to define as to its specific characters. The size and shortness of the shoulder, in excluding the Reindeer, the Stag, and the Horse, might yet serve for a Bovine animal; but the fracture at the attachment of the horns deprives us of the means of judging if it be of this character. The withers do not seem high enough for the Aurochs; or, at least, they would do only for a young individual. The marks for hair, indicated on different parts of the body, are also distributed with intelligence, for the purpose of making the drawing more effective.

From Les Eyzies.

Fig. 5. The material here used by the old engraver is not the horn of the Reindeer, but a plate from the cannon-bone or metatarsal of that animal. Of the design, unfortunately, only a part remains; it comprised at least two animals. Of one, we see the hinder part; but its croup is hidden by the head of the one that follows. This last appears to us to be a Reindeer. The general attitude, the form of the shoulder, and the different outlines would leave small doubt as to the species to which it is to be referred, were it not more evidently confirmed by the tuft of hair, characteristic of the male Reindeer, which appears under the chest in front of the brisket. The head, though well set on, is short and not

* Possibly the figure may be more correctly referred to a *leaping* Stag.

† The mouth is too widely open to express the act of rumination. Possibly, however, it might represent the panting or "blown" condition of a hunted Stag.

very correct in design: the lower lip has too salient an angle at the chin; the nose is dilated at the muzzle, as it is not in the Reindeer; and the eyes are immoderately large. In front of the ear there is, as an indication of antlers, a slender horn without a brow-antler, and which would seem as if a young animal was meant to be represented. The hatchings, or marks for hair, are cut on different parts of the figure to mark the projections either of bone or muscle. By the attitude of the body and a certain degree of animation expressed in the head, the figure recalls tolerably well the drawing of a young Wild Reindeer given by Count Mellin in plate viii. of his 'Natural History of the Reindeer' (see 'Schriften der Berlinischen Gesellschaft naturforschender Freunde,' 1783).

From La Madelaine.

Fig. 6. This is a piece of the palm of a Reindeer's Antler, by the natural contour of which the old artist has profited in engraving on its two sides, in light lines, the profile of the head and fore body of an animal which we cannot refer to any other than the Bouquetin or Ibex (*Capra ibex*). Its head is rather heavy, and the forehead is not hollow enough. The horns, sketched on one of the branches of the palm, are thin and without exactitude of proportion; nevertheless their simple curvature and the absence of any sign of twist in them permit us rather to refer this animal to the Ibex of the Alps than to that of the Pyrenees. Lastly, it is to the Ibex of the Alps that we may refer other natural and very well characterized remains that have been discovered in the Caves of this district of France.

From Laugerie Basse.

Fig. 7. Here we find a piece of the beam of a Reindeer Horn, with indication of a hole for suspension, and with broken ends. Two animals are here figured evidently galloping, with nose in the air. However much the sketch is wanting in exactitude, nevertheless the general attitude and physiognomy of the two animals, combined with a manifest expression of certain zoological characters (among others, the dilatation of the antlers, however incorrect it may be), make them, in our eyes, represent two Reindeer better than anything else.

On the opposite side of this piece of the beam of a horn are engraved two figures of Horses, which have not been reproduced on our Plate, in view of our having occasion to figure others in the course of this Publication.

From La Madelaine.

Figs. 8 *a*, 8 *b*. The objects here represented are, in the original, engraved on the

face of a cylindrical rod, which our artist has rendered diagrammatically in two separate figures, so as to reproduce the whole in halves.

On one of these halves (represented as a flat surface, fig. 8 *a*) we see two heads, one after the other, evidently referable to a Bovine genus. We may add that characters for a determination of the species are not altogether wanting. The points of attachment and the direction of the horns suffice, by themselves, to decide for the Aurochs; whilst, moreover, a more significant indication could not be offered than the convexity of the forehead and the presence of hair-tufts, both on the face and under the throat.

On the opposite side of the other half-cylinder (reproduced as a plane in fig. 8 *b*) we see, in a medley of figures, sometimes upside down, first, a Human form, with the limbs not finished very incorrectly, although the face is without any expression—a negligence probably intentional on the part of the ancient artist, who has perfectly characterized, close by it, a Horse's head and part of its chest, with their details pretty well rendered. More to the right, we perceive a second Horse's head, not so well cut. To the left of and behind the Human form, amongst rows of dashes, or figures, of which we cannot comprehend either the intention or value, there is an outline (reversed with respect to the other figures) of a Serpent, or rather of an Eel with indications of the tail-fin; and its head, with mouth open, approaches the leg of the Human figure. In this bizarre group of figures, or in the figures themselves, we avow we cannot see any intention or premeditated arrangement; and if others, more knowing, think that they here recognize the expression of an allegory, or of any symbolism, we very willingly leave to them the merit as well as the responsibility.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. V.

1

2.a

2.b

Louveau del. et lith.

Imp. Becquet à Paris

A. STONE IMPLEMENTS.

A. PLATE V.

The specimens here figured belong to a type of Implements specially adapted for being held in the hand by the thick and naturally rounded margin; whilst the opposite margin, reduced to a sharp curved edge by careful chipping, can be used as a hatchet or chopper, and seems well fitted for smashing the marrow-bones which are found broken among the hearth-stuff of the caves in great profusion.

These Choppers vary much in size, and were chiefly found in the Le Moustier Cave, a few only having occurred at Les Eyzies or elsewhere. Many seem to show signs of wear; and some have the edge chipped at a much more obtuse angle than others.

Fig. 1. One-edged cutting-instrument, or chopper, formed from a block of grey Flint, which has been first reduced by bold chipping to a flattened form, and then finely chipped on both faces along one margin, so as to produce a sharp cutting-edge in the form of a segment of a circle. The other margin is left with the natural crust of the flint, and can be conveniently held in the hand. On the side figured, a portion of the crust remains, the rest of the surface having been chipped away.

Le Moustier.

	French millimetres.	English inches.
Length	130	5·118
Breadth	88	3·465
Thickness	32	1·260

Figs. 2 *a*, 2 *b*. A similar instrument, but bevel-edged, formed of a large thick flake, that has been struck off at a single blow from a block of Flint, and then brought to a curved cutting-edge along one border by the chipping away of the outer face. This flint is nearly black, with a yellowish crust remaining on the portion that is convenient for holding in the hand.

Fig. 2*a* shows the chipped side, with some of the crust remaining; fig. 2*b*, the flat side.

Le Moustier.

	French millimetres.	English inches.
Length	95	3·740
Breadth	74	2·913
Thickness	21	0·827

A. PLATE VI.

This Plate represents twelve instruments of Flint, all of which have been thought to have one end prepared for fastening in a stick or shaft. It is not, however, always easy to decide which was really the fixed end; for, though some of these specimens may have been lance-heads, many bear evidence of use on one or both edges of what seems at first sight the but end, whilst the blade-like and unused portion is still quite sharp at the point and edges.

In fig. 3 the but is boldly and nearly equally notched on either side; and in fig. 10, though broken, it seems to have been symmetrically chipped to a tapering flattish point, like that of the other extremity of the specimen. In figs. 8 and 12 also both ends of the instrument have been pointed; but one end is more contracted than the other, having been much reduced at the edges. In all the others one end has been narrowed (with or without tapering) by the removal of a large portion of one edge. Whether this was done for insertion in a handle, or whether the diminution in width was not rather the result of wear, are questions not easily determined. In some instances it seems probable that the part of the flake which still retains its sharp edges has been protected by insertion in a handle, while the other part has been used for cutting, or rather for scraping: see figs. 1 and 2, p. 21. The care with which many of them have been chipped (not well shown by the figures) has given them a character approximating to that of the "Scandinavian" type,—also alluded to in the description of A. Pl. IV.

All figured in this Plate are from Laugerie Haute; but the same forms occur also elsewhere in considerable numbers.

Fig. 1. Light-brown flint, weathered grey. Long, narrow; one-third lanceolate; the rest semicylindrical. This has been a part of a flake dressed at one end by chipping into a plano-convex tapering shape; at the other it is narrower, tapering, and subquadrate in section. There are clear evidences of wear on both edges of the semicylindrical portion, which hence seems to have been reduced in width by having been used as a Scraper, chiefly on one side, whilst the blade-like portion (figured uppermost) was fixed in a haft.

Fig. 2. Greyish-brown flint, weathered. A flake but little modified. One half has been narrowed by rough usage, perhaps as a Scraper, on one edge, and roughly pointed by chipping at the end. At the other end also the flake has

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(DORDOGNE.)

A. PL. VI.

Louveau del. et lith

Imp. Becquet à Paris.

been chipped towards the point; but this has been broken off, and is restored on the Plate.

Fig. 3. Dark olive-grey flint, somewhat glazed; spearhead-shaped, but broken at the top. Carefully chipped on both faces, and indented by a bold angular notch at each side of the broad end.

Fig. 4. A flake of whitish flint, slightly glazed; shortened by fracture. By careful chipping on one face and at the edges it has got a long lanceolate form, with one-third narrowed by wear on one edge. Marks of use are also traceable along the other edge of the narrow part of the specimen, and on both edges of the broad end.

Fig. 5. A thin flake of flint, chipped into a lanceolate shape, and narrowed for nearly half its length by one edge having been crushed and splintered away by use. An almost saw-like jaggedness (not well shown in the drawing), referable to wear, marks the other edge of the narrow portion. The flint, originally light-brown and translucent, has been subsequently mottled by a white opacity, especially on the flat side and all along the edges.

Fig. 6. Dark-grey narrow flake of flint, somewhat glazed; sharpened at one end, by careful chipping on the ridge and its slopes, into an arrowhead-shape (point broken off); one edge also has been minutely chipped to produce the symmetrical outline; the other end (shortened by fracture) has been narrowed by breakage of the edges, probably from use, chiefly on one side. [The Figure does not well show the delicate chipping of the rounded back of the tapering point.]

Fig. 7. Small flake of grey flint, glazed; pointed by chipping on the ridge-face and edges, like fig. 6, but with less parallel sides. The broken end shows a notch (not well defined in the figure), either coarsely chipped for a but, or worn out by use, the sharp end having been, in that case, fixed in a handle.

Fig. 8. Light-grey coarse-grained flint; lanceolate; rather roughly chipped on both faces; the ends taper almost symmetrically, but one more rapidly than the other; and each has a blunt point. The edges seem throughout to have been fashioned by the general chipping of the instrument; but at the narrow end the chipping may have been subsequent to, or even produced by, wear, better evidence of which is traceable in the notches where the narrowed portion begins.

Fig. 9. Light-brown translucent flint, mottled all over with the opake whiteness due to weathering, especially on the flat side, and at the edges and ends. This is a fragment of a narrow lanceolate implement, very neatly and symmetrically made from a flake by careful chipping of the ridge-face, which has been reduced to a flat-arched outline in the broader part, and is subtriangular where it is narrower. The reduction in breadth has been caused most probably by the use of one edge as a Scraper. Very slight indications of wear occur elsewhere on the edges. [The drawing does not well represent the numerous parallel flakings of this well-chipped implement.]

Fig. 10. Dark-grey flint, with a lighter-grey portion showing Sponge-spicules and other small organisms; glazed. A broad lance-head (?), worked by bold chipping on both faces. One end broken away.

Fig. 11. The tapering end of a flake of opake-white flint, minutely chipped on the edges into a sharp symmetrical point, and towards the notched end chipped over the ridge and slopes. The commencement only of the contracted portion remains, owing to fracture; but the notch probably belonged to a one-sided Scraper, broken off close to the haft, in which the lancet-shaped end was inserted.

Fig. 12. Light-brown translucent flint, weathered (especially on one face). This is a large portion of a long blade-like instrument, with nearly parallel sides. It is broken short off at one end; and has a symmetrical, sharply tapering, flattish point at the other. Both faces have been reduced by free chipping; the face figured in the Plate is rather more convex than the other. The parallel edges of the broad part show no signs of having been used; but the angular end has the peculiar crushed and shivered condition due to its having been worn down by the use of its edges, which are affected mostly on alternate sides,—the upper side on the right of the figure, and the under side on the left hand. Under these circumstances, we may suppose that the blade-like portion was held in the hand or fixed in a handle.

Note.—In the following Table, for the specimens that have been broken, the actual measurements are placed in brackets; and the estimated length is entered in the column, for comparison with the other specimens.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	72	2·835	10	0·394	6	0·236
2.	(85) 90	(3·3) 3·543	20	0·787	7	0·276
3.	(70) 82	(2·7) 3·228	35	1·378	6	0·236
4.	(65) 71	(2·6) 2·795	17	0·669	5	0·197
5.	73	2·874	18	0·709	4	0·157
6.	(38) 46	(1·5) 1·811	5	0·197	3	0·118
7.	(37) 45	(1·5) 1·772	6	0·236	3	0·118
8.	70	2·756	22	0·866	6	0·236
9.	(64) 88	(2·5) 3·465	14	0·157	4	0·157
10.	(82) 98	(3·2) 3·858	40	1·575	7	0·276
11.	(47) 75	(1·8) 2·953	15	0·591	5	0·197
12.	(82) 98	(3·2) 3·858	28	1·102	5	0·197

NOTE.—Reverting to A. Pl. IV. (page 7) we may remark that several of the specimens therein figured show marks of having been used for cutting, scraping, or chiselling. Fig. 1. This specimen has such marks on the upper part of the left-hand edge, as figured; fig. 2 has them on the right-hand towards the top; figs. 3, 5, 10, and 12 on both edges of the broader (lower) end; fig. 6 bears marks of wear on the right-hand edge above, and the left-hand below. Fig. 7 is free from such indications of having been used, and is probably the inserted part, preserved in the haft, the used portion having been broken short off. The other specimens (figs. 4, 8, 9) less distinctly agree in some or other of the conditions above mentioned.

Among the specimens figured in A. Pl. II. (page 3) several show marks of use. Fig. 9 has been used as a Knife or Scraper on the straight edge (left-hand of the drawing); fig. 10, on the left-hand edge; fig. 14, on the lower half of the right-hand edge; fig. 21, on its convex (left-hand) edge; and fig. 24 on the left-hand edge.

Fig. 1*a*.

Fig. 1*b*.

Fig. 2.

Figs. 1*a* and 1*b* represent the two faces of an implement of whitish flint, chipped into shape, and used for scraping. The blade-like portion has been set in a handle or held in the hand; and the other end has been much worn by scraping with the two sides alternately, whereby the narrow end has been tapered. *Nat. size.*

Fig. 2 is a neat flake of grey flint, that has been worn away along the middle part of one edge by scraping. The sharp end has probably been set in a handle. *Nat. size.*

A. PLATE VII.

A series of Flint Implements, somewhat spatulate in form, having one end nearly semicircular, the other tapering, and the sides more or less parallel. They

Fig. 3.

Fig. 3. A Tanged Scraper of chalcedonic flint (weathered); from La Madelaine. *Nat. size.*
a, Ridge face. *b*, Edge. *c*, Flat, inner, or flake face.

have all been formed of flakes,—the ends, and sometimes one or both of the sides, having been chipped. One end has been rounded by a series of small fractures perpendicular to the flat or inner face of the flake; and a curved solid terminal edge has been thus formed, such as we find in certain Stone Implements that the Esquimaux at present use in scraping and dressing skins. (See figs. 5*a*, 5*b*, page 14.)

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. VII.

Louveau del et lith.

Imp. Becquet à Paris.

The sides of the flakes have been here and there chipped, so as to produce a parallelism of the edges and symmetry of form.

The small end in these implements suddenly tapers to a wedge-shaped point, produced usually by two or more bold lateral fractures, perpendicular to the flat face, and at an angle to the axis of the flake. In some specimens (figs. 4, 8, 13) the pointed end has been formed, or modified, by numerous chippings at the edges. In either case the pointed end is fit for insertion in a handle. Fig. 4, however, appears to have had that end used as a drill or rimer. Usually the pointed end or "tang" is quite free from all but merely accidental chippings.

In many instances the terminal curved edge of these tanged Scrapers has been blunted by use; and sometimes the side edges seem to have been jagged by wear.

These Implements are profusely distributed throughout the Hearth-stuff of the Caves of Dordogne, and are of very various dimensions and proportions in length and breadth. Some have been formed of Flint-flakes six inches long, or more; and some of very small flakes. Some have both ends provided with the peculiar rounded edge; but when there is only one rounded end, the other end may be either pointed (as in the figures of A. Plate VII.), or left unworked, presenting the original state of the flake, and often well adapted for holding in the hand.

Fig. 1. A rough high-ridged curved flake of dark-coloured flint, weathered light grey; rudely chipped; short. Indistinct marks of use on the rounded end.
Le Moustier.

Fig. 2. Neat flake of dark-coloured flint, slightly curved; somewhat glazed; well worked into a regular form, with neatly rounded end, parallel sides, and sharp tang. The rounded end has been used, its edge being minutely crushed.
Laugerie Basse.

Fig. 3. Long, arched flake of greyish-brown flint, somewhat glazed; neatly worked along the edges; the curved solid terminal edge of the flat face evidently blunted by use. This specimen, and figs. 10 and 11, have the semicircular edge worn *smooth* by use, but not to such an extent as is shown by a Scraper (of the same flint as fig. 11) in the British Museum, brought from Bruniquel.
Laugerie Basse.

Fig. 4. A spatulate scraper of greyish-brown flint, containing Sponge-spicules; somewhat glazed, and partially weathered with a grey opacity on the ridge face

of the flake; chipped into a broad blade, hollow with the arching of the inner or flake face, boldly curved at the end, chipped on the side edges, and tapering towards the point, at a short distance from which the blade is suddenly narrowed and becomes subtriangular in section. From the crushed state of its lateral angles, the pointed end has evidently been used as a Drill. The other end also has been minutely splintered along its edge by use.

Laugerie Basse.

Fig. 5. A short, narrow, thickish, straight Scraper, of light-brown flint, glazed. The longer of the two lateral edges has been minutely chipped, or perhaps blunted by use. The other retains almost perfectly the original sharp edge of the flake. The tang has been produced by bold lateral fractures. The rounded end has been used.

Laugerie Basse.

Fig. 6. Subovate, thick; formed of a flake of chalcedonic flint; glazed, and rather opake and mottled by weathering on the ridge face. The tang is coarsely shivered. Marks of use on the other end are indistinct.

Laugerie Basse.

Fig. 7. Somewhat similar in form to fig. 6, but narrower and more neatly made. Light-grey translucent flint, opake and white all over by weathering. The scraping-end has been evidently used.

Les Eyzies.

Fig. 8. Rude, almost as broad as long, of nearly uniform thickness, slightly curved underneath. Dark-grey flint, weathered all over. The irregularly semicircular front edge shows evidence of having been roughly used.

Les Eyzies.

Fig. 9. A longish flat Scraper, of mottled grey granular flint (showing the particles of *Polyzoa*, which composed the limestone now converted into flint); glazed, and retaining some of the brown calcareous hearth-stuff on its inner flake-face. A flat tapering flake has in this instance been trimmed at the two ends,—the lateral edges not having been worked, though minutely jagged, possibly from wear. The scraping-end has been used, as shown by its partially crushed edge.

Les Eyzies.

Fig. 10. Narrow, thick, curved Scraper, of dark-grey coarse-grained flint, full of small fragments of fossils; glazed. Under a lens the semicircular solid edge of this Implement is seen to have been somewhat blunted by use. The lateral edges are those of the original flake.

La Madelaine.

Fig. 11. Straight, with parallel sides, which have been jagged or chipped. The flint is brownish and speckly grey (minute brown and dark-grey spots in a whitish mass), granular with Foraminifers (*Textularia*, &c.) and Polyzoan and other fragments (as in fig. 9 and other specimens). The tang has been skilfully made by breaking off equal portions of the flake from either side; but its apex has been blunted by recent fracture. The scraping-edge at the end has been smoothed by much use.

Les Eyzies.

Fig. 12. Somewhat oblique, with elliptical scraping-edge; made from a slightly curved flake of chestnut-brown or dark honey-coloured flint*, finely granular and faintly banded. Somewhat glazed, except where the fracture is naturally more dull than elsewhere. The rounded end has its edge minutely splintered by use.

Laugerie Basse.

Fig. 13. Spoon-shaped, much arched by the curving of the original flake, from which it has been formed by chipping all round. The scraping-end has been used like that of fig. 12 and others. Brownish-grey flint; full of Sponge-spicules; glazed, and retaining some patches of the brown stalagmitic Hearth-stuff.

Les Eyzies.

* Like that found at Pressigny le Grand (Indre et Loire).

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	54	2·126	25	0·984	13	0·512
2.	78	3·071	26	1·024	10	0·394
3.	110	4·331	29	1·142	7	0·275
4.	68	2·677	33	1·299	8	0·315
5.	45	1·772	14	0·551	5	0·197
6.	44	1·732	25	0·984	10	0·394
7.	42	1·654	23	0·906	8	0·315
8.	45	1·772	38	1·496	10	0·394
9.	73	2·874	26	1·024	6	0·236
10.	75	2·953	20	0·787	9	0·354
11.	85	3·347	30	1·181	8	0·315
12.	77	3·032	27	1·063	6	0·236
13.	76	2·992	37	1·457	10	0·394

NOTE.—In A. Pl. II., fig. 14 (see page 4) has the form of a small tanged Scraper, of very neat make; its wedge-pointed end is not worn at all; and its scraping, or rather chisel-like, bevelled end has been only slightly chipped, perhaps by accident; but one of its side edges seems to have been worn away by having been used as a Scraper, as far as the notch, like most of the specimens figured in Plate VI. Fig. 15 is also "tanged," but less neatly; and its other extremity is merely that of the original flake slightly modified. Fig. 24 is a thick narrow piece of flake, with a well-defined tang. One margin is thick and straight, the other thin, curved, and much worn (not shown by the figure).

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. VIII.

Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE VIII.

Ten Implements formed of Flint-flakes, either without any further chipping (fig. 3), or by more or less reduction of the ends and edges. In some, each end has been narrowed to a wedge-point, chiefly by lateral fractures (figs. 5 & 8). In fig. 4 both ends have been symmetrically shaped by chipping. Others have one wedge-like thick end, or tang, probably for insertion in a handle, whilst the other extremity is more or less modified by chipping (figs. 1, 2, 6, 7, 10)—sometimes roughly approaching the rounded end of a Scraper, sometimes ending as a blunt blade (fig. 9). Some of the specimens appear to have been either unfinished Scrapers, or old implements much used and broken. There may have been other uses for both the blunt and the pointed ends; and in some cases the side edges seem to have been fit, if not used, for scraping and cutting, like the blade of a carpenter's "spoke-shave" (fig. 8), or a rough saw (fig. 9). Such flakes, dressed and undressed, as shown in this Plate, are exceedingly abundant in the Caves.

Fig. 1. Light-grey, translucent, chalcedonic flint, with Sponge-structure; slightly glazed. A simple flake; with a sharp wedge-point defined by small lateral fractures. The other end is blunt, bears the "bulb of percussion" on the flat face, and has been somewhat reduced and slightly rounded by chipping. The lateral edges, sharp but jagged, may have been used as saws.
Laugerie Basse.

Fig. 2. Dark-grey opake flint, full of Sponge-spicules; highly glazed. The flake has been wedge-pointed at one end; and the other retains a small part of the round solid edge (smoothed by use) of a Scraper, but is otherwise irregular from old fractures. The side edges have been partly chipped, probably by use.
Les Eyzies.

Fig. 3. A long rough flake of dull cream-coloured flint, mottled with yellowish-brown (probably a brownish flint whitened and opake by weathering). The sharp and thin end has been narrowed by the removal of part of one edge by a long lateral fracture; the point was broken off before the weathering took place. Except at the obliquely fractured side of the point, both edges are sharp and minutely jagged.
Les Eyzies.

Fig. 4. Yellowish, translucent, chalcedonic flint, with brownish flocculence; glazed. This has been a flake chipped along the edges and ends (but on the upper or ridged side only) until reduced to a nearly symmetrical acute oval, with rough but somewhat sharp solid edges and points. Either end fixed in a handle would leave the other as a small strong pointed chisel; or if either margin were imbedded in a handle, the other would be available as a strong and slightly curved scraping-edge.

Laugerie Haute.

Fig. 5. Part of a thick flake of dark-grey opake flint with Sponge-spicules; glazed; reduced at the ends by lateral oblique fractures, and some chipping, to thick wedge-points. Side edges short, parallel, minutely chipped by use.

Les Eyzies.

Fig. 6. Mottled dark-grey rough flake, trimmed as fig. 5, but less regularly; glazed. Part of an old smooth (water-worn?) surface of the flint remains on the right-hand side of fig. 6.

Les Eyzies.

Fig. 7. Light-brown granular flint, of the same kind as that in fig. 11, Pl. VII.; slightly glazed. Piece of a flake, wedge-pointed at one end by an oblique lateral fracture on one side, and by the chipping and crushing of use on the other; truncated at the other end, with one angle chipped away, and the other recently broken. Side edges unequal, nearly parallel, one chipped by use. Some Hearth-stuff adheres to the specimen.

Les Eyzies.

Fig. 8. A thick, narrow, curved flake of grey flint; almost wholly whitened and opake by weathering, and highly glazed. The two ends are wedge-pointed. One side of each point, alternately, has been formed by oblique lateral fracture. One of the other slopes has been worn down by hard usage. The remaining slope has been chipped into shape. One of the side edges is irregular and not trimmed; it has been partly used: the other is nearly straight, chipped, and, by the arching of the flake, well adapted for a "spoke-shave" Scraper, for which it has perhaps been used.

Laugerie Basse.

Fig. 9. A flake of dark-grey flint, with Sponge-spicules; glazed. At one end this has been wedge-pointed, by the usual oblique converging lateral fractures

perpendicular to the flat face, as shown at the upper ends of the figs. 9*a*, *b*, *c*. The other end has been trimmed (rather more than the corresponding part of fig. 1) into a rounded blunt blade-end, the "bulb of percussion" having been almost entirely removed. One side edge, rather straighter than the other, has been minutely chipped by use. The other has been similarly used, and, roughly notched by old fractures, probably served as a saw.

Fig. 9*a* shows the ridge face; 9*b*, the flat face; 9*c*, the edge-view.

Le Moustier.

Fig. 10. Part of a flake of dark-coloured coarse-grained flint; glazed. One end wedge-pointed by bold lateral fractures; the other, or bulb-end of the flake, somewhat reduced by a side chip. The parallel edges are minutely chipped, perhaps by use.

Laugerie Basse.

[This figure is not correct, the outline of the flat side having been substituted for that of the convex face.]

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	52	2·047	30	1·181	5	0·197
2.	47	1·850	19	0·748	7	0·276
3.	106	4·173	35	1·378	10	0·394
4.	47	1·850	20	0·787	5	0·197
5.	54	2·126	24	0·945	7	0·276
6.	57	2·244	30	1·181	12	0·472
7.	57	2·244	32	1·260	10	0·394
8.	78	3·071	25	0·984	9	0·354
9.	100	3·937	33	1·299	7	0·276
10.	74	2·913	34	1·339	10	0·394

B. BONE IMPLEMENTS, &c.

B. PLATES III. & IV. (One Plate.)

The dimensions of the objects we have at present to describe make it necessary for the Plate to be of double the ordinary size. Hence Plates B. III. & IV. have to be consolidated in one.

Some of the specimens before us, showing to some extent the form that it was intended they should take, can be regarded only as having been roughly begun (if indeed they be not remnants from which material has been removed), as they keep the ruggedness of fracture even where they would have to be held while being completed. Such are specimens figs. 2 and 3. Many of those who have examined the four almost complete specimens figured in this Plate have thought that they may have been used as weapons by the primitive people; and this interpretation, though not unsuitable for figs. 2 and 3, would be less applicable to figs. 1 and 4.

There have been found many stems or beams of Reindeer Antlers ornamentally carved throughout their length. Some, moreover, are pierced with a hole in the broad part near the base (fig. 4); and there are others that have two, three, and even four such perforations. We shall subsequently figure a Reindeer Horn with four holes, arranged in a row along its stem. Very flat and thin, its thickness having been reduced by cutting, it could scarcely have been used either as a weapon or as an implement for any work whatever. Others have not been pierced at all. The holes referred to are sometimes large enough to admit of the finger, frequently much smaller.

It has been suggested that these Reindeer Horns, so fashioned, and sometimes ornamented with careful and very numerous carvings, might have been either symbols of authority, or simply marks of social position. With respect to this, it may be remembered that among the ancients, as we find in Homer, kings and chiefs constantly carried a sceptre, or staff of command. The sceptre, however, was not always reserved to kings and princes; for subsequently, in the towns of Greece, the principal citizens hardly showed themselves in public without carrying in their hand one of these marks of distinction.

Herodotus (I. cxcv.), speaking of the Assyrians, says that "each person has a

RELIQUIÆ AQUITANICÆ

(DORDOGNE.)

Louveau del. et lith.

Imp. Becquet, à Paris.

seal-ring and a walking-stick, upon the top of which is carved an apple, a rose, a lily, an eagle, or some figure or other; for to have a staff without a device on it is unlawful." Strabo (Book XVI.), treating of the manners of the Assyrians, repeats almost literally what Herodotus stated. "Each," he says, "carries a ring on the finger, and a staff, not simply rough, but ornamentally carved, being surmounted with an apple, a rose, a lily, or some such thing."

It appears also that the same custom existed among the Hebrews in very ancient times; for we see in 'Genesis,' ch. xxxviii. v. 18, that Tamar demands of Judah, in pledge for his promise, his signet, his bracelet, and the staff that was in his hand. This staff, walking-stick, or wand, may be supposed to have borne some particular marks, since Judah recognized it afterwards (*loc. cit.* v. 26).

We may add that, among the Athenians, the members of the Areopagus (the institution founded by Cecrops) sat on a stone seat, and held in the hand, as a mark of office, a sceptre-like staff (Suidas, vol. i. p. 411).

With reference, then, to this explanation of the possible use of our ornamented stems of Reindeer Horn, that they may have been used either as sceptres of command, or as symbols of rank, we shall have to admit, if this interpretation be applicable, that the tribes of indigenous hunters in Périgord were already numerous, and in a social condition so far systematized that the authority of the chiefs, or the unequal conditions of society were recognized and shown by external signs.

Putting aside the more fanciful notions that have arisen about these curious relics of the past, we bring forward this suggestion now offered as to the use of the Carved Antlers with the view of exciting our Readers to examine and to criticise. They will perhaps discover better explanations, and thus our end will have been attained.

[To such carved horns as are here described, are referable some at least of the specimens figured in B. Pl. II., particularly figs. 3, 7, and 8.]

Fig. 1. The stem or beam of a Reindeer's Antler, rather slender, probably from a young individual, or a doe. It was a shed antler; and these are always harder and more compact than others; such, indeed, are even at the present time preferred by workmen who use this substance in the arts. The brow-antler and the second branch (bez-antler) have been taken off; and close behind their place of attachment the stem has been perforated with two round holes, of unequal size, and edged with a raised border. On the long part of the stem some

outlined shapes are carved. Two of these (shown in the figure) are generally taken for figures of Fishes. The tail of the second of these is confused with the much better-defined head of a Horse, of which the ear, the mane, the line of the back, and even the tail leave little to find fault with; but the artist, cramped doubtless by want of space, has been more negligent in reproducing the legs. On the side opposite to that shown on the Plate are three other Fish-like figures, and a fourth is on the concave surface, altogether forming a group of six Fishes. There is nothing represented on the other side of the Horse. The further end of the specimen having been lost by an old fracture, we cannot tell whether it was obtuse or pointed.

Found at La Madelaine.

Fig. 2. At first sight this specimen is always taken for a Poniard. It has indeed been evidently tapered and pointed at one end (either intentionally, or by removal of material to be otherwise used); but at the other end, or but, which would have been the handle, the rough parts, left on detaching the two branches near the base, have not been smoothed down. This horn was broken from the skull, and has some of the frontal bone still attached. The intention may have been to ornament the but by carving; and even now this rugged end fits the grasp of the hand, like a rough pistol-but.

Fig. 3. Another antler, larger than the foregoing, and also broken from the forehead of the freshly killed Reindeer. Both the brow-antler, and the second branch higher up (bez-antler), have been shortened, but not cut off at the base. Several lines have been cut along the beam; and the two middlemost of these border a series of little rhombs, cut in relief, for nearly the whole length. The specimen thins off gradually towards the extremity, which (lost by recent fracture) was probably pointed, with a slanting edge. Although the ornament was considerably advanced in this specimen, the workman had not removed the projections of the broken branches and frontal bone from the part which ought to serve for the handle, and which perhaps was intended to receive one or more holes, or to be carved in some other manner*.

From Laugerie Basse.

* In a subsequent Part we intend to figure and describe a recent Reindeer Antler, cut and ornamented nearly in the same manner as this ancient example from Laugerie Basse. The modern specimen, met with a few days since in the late Mr. H. Christy's Collection, formed a part of the Vancouver and British-Columbian Contributions to the International Exhibition of 1862.

Fig. 4. Another Antler, belonging to a young Reindeer, or rather to a female, judging by its small proportions. There is a round hole through it at the broad part where the brow-antler was set on. The stem is marked both by several longitudinal furrows and by numerous irregular cross cuts. If this was meant for ornament, it must be regarded as very coarse work. At its base this antler is still attached to the broken frontal bone. It is truncate at the further extremity.

From La Madelaine.

Fig. 5. A much carved and flattened piece of Reindeer Horn, broken at both ends, but bearing three entire holes and part of a fourth. The holes have a raised border given to them by a groove running more or less parallel to the circumference, above and below, but not between the holes.

We cannot possibly guess the original form and use of this specimen, any more than those of the following, except from its analogy to the other perforated Deer-horns, above described.

From La Madelaine.

Figs. 6*a*, 6*b*. Another fragment, analogous to fig. 5, bearing three holes at least. On one of its surfaces (fig. 6*b*) is carved a series of figures comparable with a vertebral column, or the fleshless back-bone of an animal, five and a half of such joint-like or hourglass-like shapes being visible.

From La Madelaine.

[We have lately been informed, by Dr. A. A. Blandy, that, although the Indians of the Amazon, South America, do not at the present time either carve or use such implements as the worked Antlers illustrated by B. Plates III. & IV., yet they carry similar things for ornament. The holes are both for ornament and suspension, as these carved horns are hung at the waist of Chiefs, and seem to be implements or weapons used very many years ago, and now carefully preserved,—the ordinary weapons now used by the Indians being the spear and bow, and even the rifle and common shot-gun.—June 30, 1866.]

A. STONE IMPLEMENTS.

A. PLATE IX.

Two large, simple, untrimmed Flakes of Flint, from the Gorge d'Enfer (see page 4), are here shown, such as are not uncommon in the Caves, having been used for cutting and scraping, without any other preparation than having, perhaps, one edge set in a piece of wood or horn for a handle or support. These almost Strigil-shaped Flakes have been struck off blocks of flint like those figured in A. Pl. I., a flake at a blow. The upper ends on Pl. IX. were uppermost in the process of flaking: the "bulbs of percussion" are slight, and not visible in the figures.

Fig. 1. A long curved flake of opake, yellowish, granular flint, somewhat glazed. The edges are irregularly chipped; but some parts, especially on the left-hand side of the figure, have been worn by use.

Fig. 1*a* shows the ridge face, and fig. 1*b* the edge view of the flake.

	French millimetres.	English inches.
Length	174	6·850
Breadth	38	1·496
Thickness	10	0·394

Fig. 2. A long curved flake of dark-grey granular flint; similar in general character to fig. 1. The straight portion of the left-hand edge in the figure is sharp and finely jagged, and has probably been used. As an implement, this flake could be conveniently held in the hand by the lower curved portion, and the straight edge used for cutting or scraping.

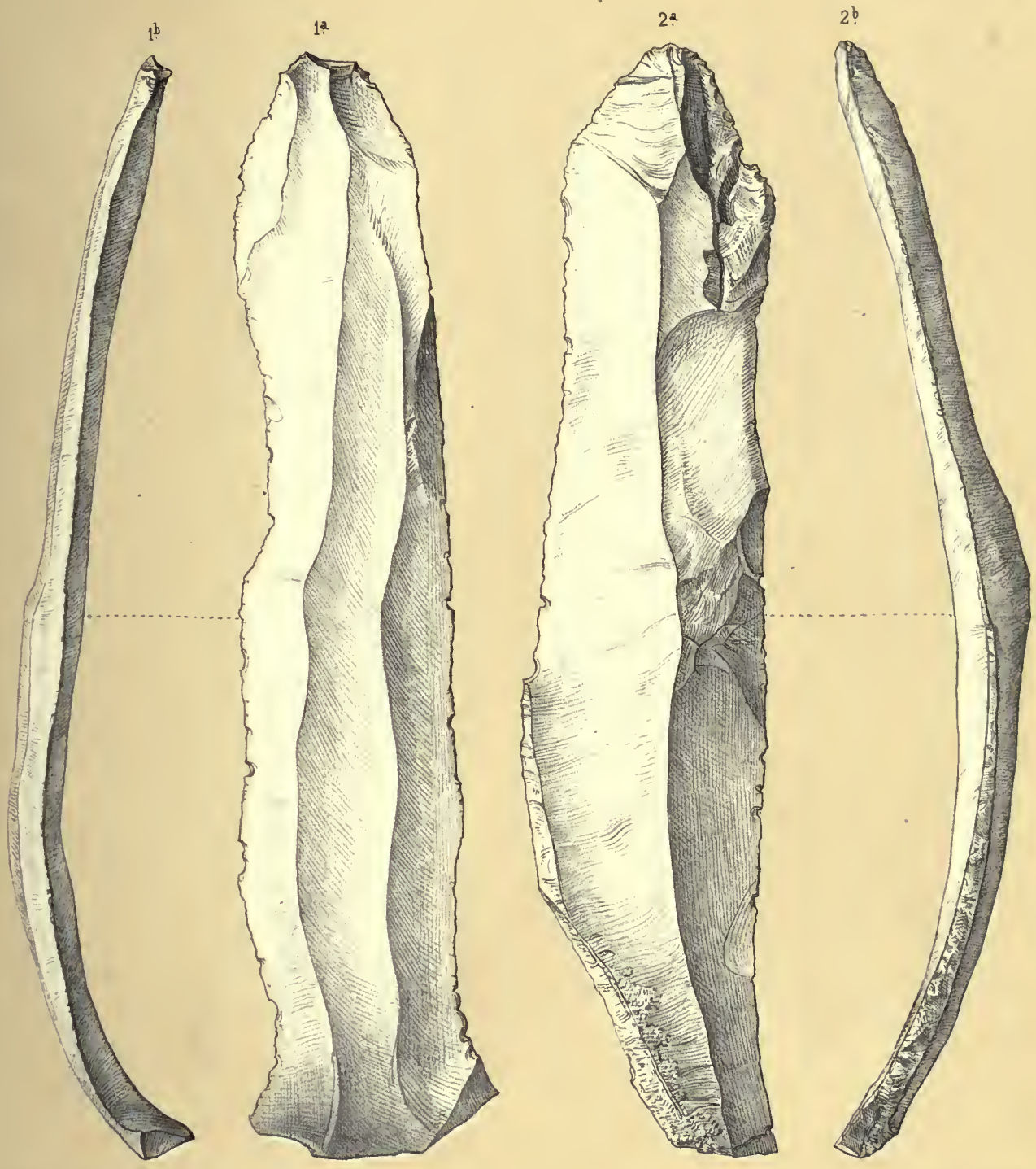
Fig. 2*a* shows the ridge face, and fig. 2*b* the edge view of the flake.

	French millimetres.	English inches.
Length	185	7·284
Breadth	41	1·614
Thickness	12	0·472

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. IX.



Lauveau del. et lith.

Imp. Becquet à Paris.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. X.

Louveau del. et lith.

Imp. Becquet à Paris

A. PLATE X.

Six implements of worked Flint, of which four have one end chipped into the semicircular or elliptical solid edge of a Scraper (see p. 22), and two have both ends so prepared. Four of these implements have, more or less distinctly, marks of use on the rounded end; and of these the two largest have had their side edges used also. One (fig. 5) looks like a Scraper with one end narrowed for fastening in a handle: but its round edge is intact; and the seeming tang has been reduced by its two edges having been used in scraping. Another specimen (fig. 6), rounded at its two ends, has been worn only on its two lateral edges by use as a Scraper or "spoke-shave." Hence the rounded ends have in some cases been prepared merely for neatness or for convenience of holding, and not necessarily as scraping-edges. All these specimens are from the Gorge d'Enfer (page 4), and are more or less glazed.

Fig. 1. A portion of a large, regular, slightly curved flake of opake yellowish flint, striped with white and brown along one edge, where part of the original light-brown crust remains. Carefully rounded (like the Scrapers of A. Pl. VII.) at one end, which is slightly worn by use; truncate at the other. The thin edge (right-hand in the figure) has been minutely chipped by use throughout its length.

Fig. 2. This also has been prepared from a large flint-flake, opake, purplish grey along the middle, and banded with white and faint yellow along the sides. Obliquely rounded at one end. Evidences of use appear on the two side edges and along the rounded end.

Fig. 3. Part of a thick flake; rounded at one end, truncate at the other. Opake and yellowish, but whiter under the dark-brown irony crust which remains on the outer surface. As with figs. 1 and 2, and many other specimens, this flint was once a Polyzoan limestone. The elliptically curved end and the sides have been boldly chipped into shape; and the edge, especially at the shoulders of the curve, has been worn by use.

Fig. 4. A Scraper of mottled grey flint, with large Sponge-spicules, Polyzoa, &c., irregularly rounded at one end and roughly tapered at the other. This has been chipped out of an old flake, the weathered, shining, and iron-stained surface of

which is partly preserved on the two chief faces of the specimen. The rounded end bears some marks of use.

Fig. 5. A piece of opake, granular, whitish flint-flake; shaped like a Scraper at one end, chipped boldly on the parallel lateral edges, and much worn by use on both sides of the narrow end. [The minute flaking and chipping in the worn hollows not shown in the figure.]

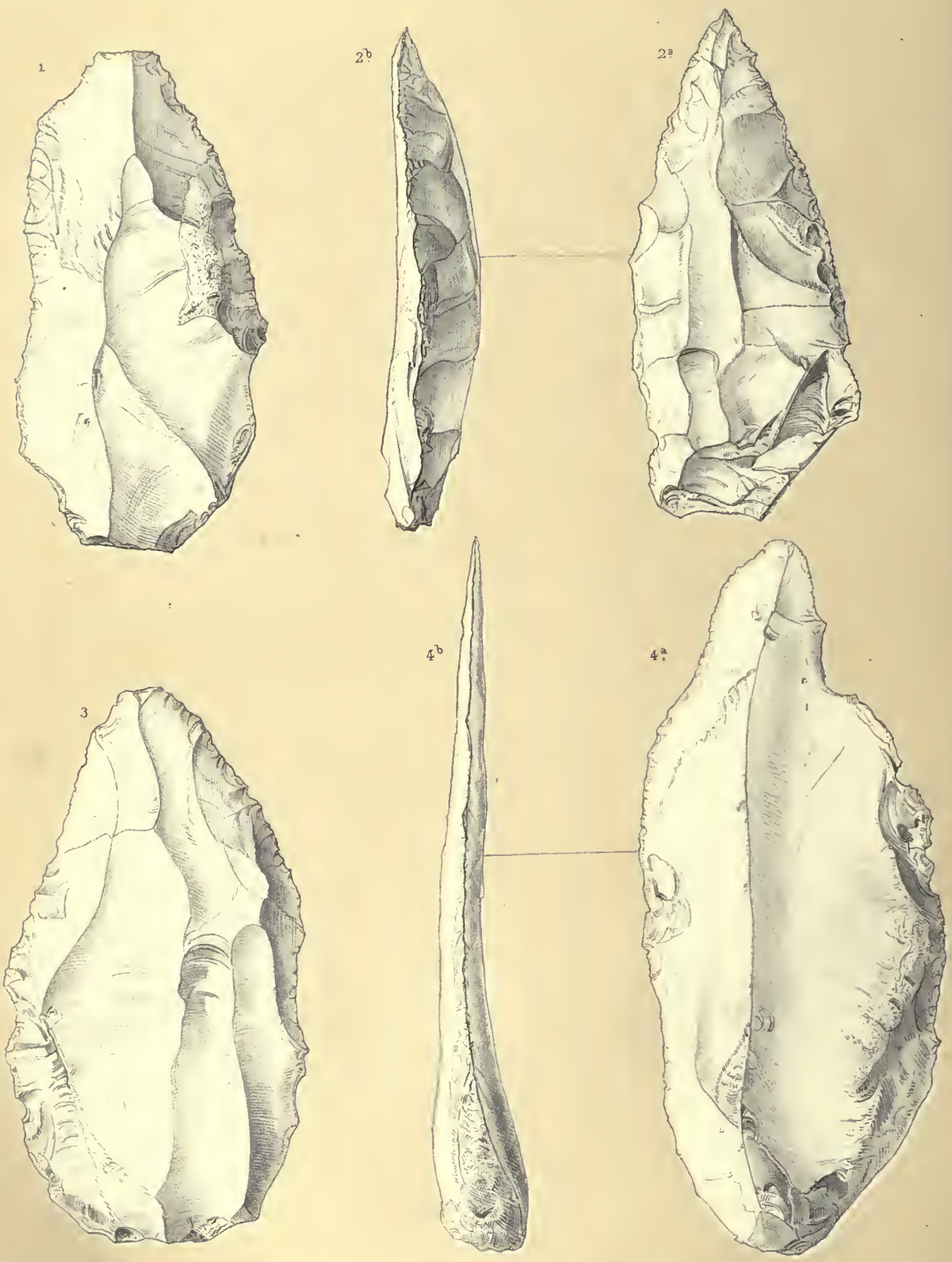
Fig. 6. Piece of a grey flint-flake (containing *Orbitoides* and *Polyzoa*); trimmed at each end, by the usual bold chippings perpendicular to the faces, into irregular curves. The parallel side edges much chipped and crushed by use.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	165	6·496	48	1·890	17	0·669
2.	158	6·221	62	2·441	25	0·984
3.	69	2·717	40	1·575	29	1·142
4.	65	2·559	35	1·378	16	0·630
5.	59	2·323	27	1·063	5	0·197
6.	53	2·087	32	1·260	6	0·236

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XI.



Louveau del et lith.

Imp. Becquet Paris

A. PLATE XI.

Four lanceolate specimens, somewhat glazed; three of them show, in crushed and worn portions of their edges, evidences of having been used. Fig. 4 is merely a flake, with no modification of its edges. Figs. 1 and 3 also were flakes, but have been dressed and used. Fig. 2 is almost symmetrical, chipped all over, after the fashion of the many flint implements found in the gravel of the Somme Valley and elsewhere: forms like the others, however, are not wanting in that old gravel.

Fig. 1. Roughly lanceolate flake of brown granular flint (Sponge-spicules, &c.), truncate at the broad end, where the "bulb of percussion" and a large conchoidal facet are well marked on the flat face, which is not shown in the figure. The point at the other end has been broken off. Marks of use are plain on the upper half of the left-hand edge of the figure, and also in the hollows on either side of its upper end.

Le Moustier.

Fig. 2. An acutely lanceolate implement of dark-grey flint, with Sponge-spicules, &c., sharp at one end, roughly truncate at the other; more convex on one face than on the other; with the edges irregularly crenulate. Shaped by bold and nearly parallel chipping, at a high angle, along the edges of one face. The edge has some slight marks of use on either side of the point.

Laugerie Basse.

Fig. 3. An acute-ovate implement, chipped out of a broad, mottled, grey flake, having the "bulb" and roughly conchoidal face on the flat side (not figured). Marks of use exist on the upper right-hand edge of the figure. The opposite edge is less distinctly worn. The point is broken.

Le Moustier.

Fig. 4. An amber-coloured, translucent, broad flake, with a largely conchoidal under-face, struck off from a water-worn (battered and weathered) mass of flint, that had been broadly facetted by former fractures. It has no artificial chippings on the edges.

Fig. 4*a* shows the ridge face of the flake; 4*b*, the edge view, with the low "bulb" of the conchoidally fractured under-face.

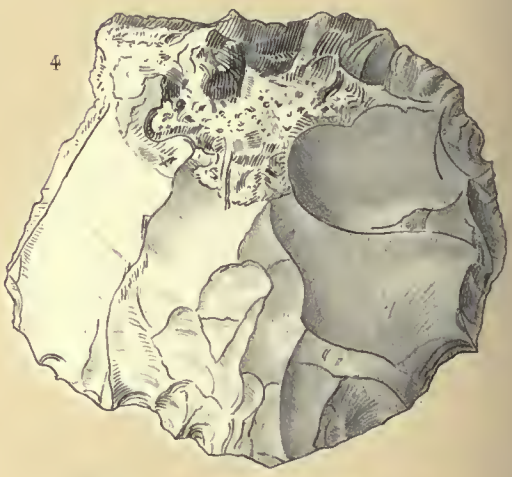
Laugerie Basse.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	91	3·583	45	1·772	5	0·197
2.	90	3·543	36	1·417	18	0·709
3.	100	3·937	55	2·165	6	0·236
4.	127	5·000	54	2·126	16	0·630

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XII.



Louveau del. et lith.

Imp Becquet, Paris

A. PLATE XII.

Six roughly shaped specimens, in which an irregular cutting-edge has been produced on some part of the margin by thinning it by bold parallel chippings on one or both faces of the stone. Figs. 1, 2, and 4 are easily held in the hand, the thick rough part against the palm; and the curved edge is then exposed below the closed fingers and thumb as a Scraper or Chopper: and in these specimens that edge, as well as the other, bears some marks of use. The implements before us are thus comparable in some respects with the larger "Choppers" described at page 17. Figs. 3 and 6 have been roughly flattened and squared; the thinned edge of the former (right-hand side of the figure) has been partly crushed by hard knocks. Fig. 5 looks like the broad end of an axe-head.

These were all found at the Moustier Cave, and have glazed surfaces.

Fig. 1. An irregularly triangular piece of a rough, dark-grey, mottled flint-flake, coarsely chipped on one face, so as to have a jagged cutting-edge on two margins, both of which seem to have been somewhat worn by scraping or cutting. A portion of the highest part of the ridge face has either been roughly weathered, or, more probably, was so close to the original water-worn and battered surface that it retains traces of its weathered condition.

Fig. 2. A grey, mottled, somewhat heart-shaped flake, showing the "bulb of percussion" on the inner face, at the obtuse projection; trimmed on the convex face by bold chipping so as to have a cutting-edge all round, except at the thick corner where the "bulb" is. Both the curved and the straight edge have been used.

Fig. 3. A piece of translucent amber-coloured flint, retaining on one face the old water-worn light-brown crust, and coarsely chipped all round on the other, so as to have an irregular oblong shape with a rough angular edge, which is bruised where thinnest (right-hand side of the figure).

Fig. 4. Portion of a dark-grey mottled flint-flake (with Sponge-structure), retaining part of the original, brown, worn crust, but otherwise so shaped by bold parallel chipping as to have a roughly circular cutting-edge along two-thirds of its circumference, the remainder forming a corner of two nearly straight solid edges. The circular edge worn here and there by use.

Fig. 5. Greyish flint, mottled white by weathering. The side not figured retains a small portion of the old yellowish crust; excepting this, all the surface has been removed by free chipping, and a hatchet-like form produced; the narrow end appears to have been lost by fractures; and the remainder, irregularly quadrangular, has a rough cutting-edge on three sides.

Fig. 6. Dark greenish-grey pitch-like flint, translucent at the edges, full of minute Sponge-spicules, &c., and still retaining the old, light-brown, smooth-worn crust on the flat side. Roughly squared and sharpened at the edges by bold chipping.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	70	2·756	55	2·165	17	0·669
2.	70	2·756	60	2·362	16	0·630
3.	57	2·244	48	1·890	18	0·709
4.	66	2·598	60	2·362	20	0·787
5.	88	3·465	86	3·386	25	0·984
6.	80	3·150	72	2·835	24	0·945

Louveau del. et lith.

Imp. Becquet à Paris.

B. BONE IMPLEMENTS, &c.

B. PLATE V.

Most of the specimens represented in this Plate may be regarded as having been intended to be worn on the person, as ornaments or amulets, and some perhaps as memorials and trophies of the chase. They have indeed nearly all been pierced with one or more holes, so as to be attached or suspended.

One only of these articles is of Stone. By far the greater number are formed of the Incisor and Canine Teeth of Carnivorous or of Herbivorous Animals; and among them can be recognized teeth of the Wolf, of the great *Bos*, the Ibex, and the Reindeer. In the sequel we shall have occasion to figure the Incisor of a Horse, perforated near its root, very probably for a similar purpose.

Such perforated Teeth have been used in all ages and places; and indeed at the present day we find them among divers nations that are either savage or have remained in a low state of civilization.

Almost every work on primitive antiquities published of late years affords us figures of Teeth thus pierced. They have been quoted from the First Stone-Age in Denmark; from the Lake-habitations of Switzerland; and from several sepulchres belonging to a high antiquity. Especially, however, under the Rock-shelters and in Caves, that were refuges for the aboriginals of Western Europe, have they been collected in the greatest numbers.

The same usage obtained also in other and distant regions early in the Human Period. Thus MM. Meynier and Louis d'Eichthal have found in a Bone-cave of Western Siberia, in the Province of Tomsk, the long Canines of the Musk-deer (*Moschus moschiferus*) perforated near one end.

Various explanations have been offered as to the intended use of these objects, thus prepared to be attached to the person. Some have thought that imaginary properties and virtues were attributed to them. M. F. Troyon, mentioning the Bears' teeth, having holes through their roots, found in the tombs of the ancient Livonians, adds that "they were without doubt worn as amulets." In the Catalogue of objects found in the diggings at Hallstatt (sketches of which I have been enabled to refer to, thanks to the kind assistance of my learned friend Dr. Pruner-bey), M. Ramsauer says that he has collected many stones that had

been worn as talismans and amulets, and that he also found teeth of Bear and Wolf drilled for the same purpose. He adds moreover that even now-a-days the same kind of teeth are hung on the necks of children to help them in cutting their teeth. Thus we see that in certain cases the employment of these pierced teeth may have had a double object. M. de Mortillet has quite lately shown me a lower Canine of *Sus* (Boar or Pig), which he had himself obtained in a province of Central Italy, where such teeth are still commonly used among the people, being mounted in silver, with a little ring for suspension. Usually one of them is first placed on the swaddling-clothes of new-born infants, to avert the malevolence and all other influences of the bad spirits; afterwards it is hung at the neck of the same children, and, when suffering the pain of cutting their teeth, they instinctively put it in the mouth and bite it between the gums,—just supplying the place of the toys ("corals") specially prepared among us for the same purpose.

In other cases, however, the teeth of the Boar and large Carnivores may have been kept and worn as memorials of the Chase. It is known also that, among the people of some islands in the Pacific Ocean, travellers have seen necklaces made of a series of many human incisors worn as ornaments. There we see real trophies of war, mostly accompanied by cannibalism, of which, however, we have as yet found not the least trace in our ancient Stations of the Dordogne or Pyrenees.

At the same time we must recollect that in the greater number of instances these teeth, perforated at the root, might be only articles of ornament and dress. Thus used they are still found in various regions of the globe, and particularly among the Esquimaux, whose women make for themselves girdles, on which are threaded by hundreds teeth of Wolf, Fox, Musk-ox, and other animals; and the men themselves sometimes have recourse to this kind of ornament. Captain Parry * describes a kind of diadem or head-dress worn by the men on certain occasions, thus: he says, "the handsomest thing of this kind, however, was to be worn on the head by men, though we did not learn on what occasion; it consisted of a band, two inches in breadth, composed of several strips of skin sewn together, alternately black and yellow; near the upper edge hair was artfully interwoven, forming with the skin a very pretty chequer-work; along the lower edge were suspended more than a hundred teeth, principally of the Deer, neatly fastened by small double tags of sinew, and forming a very appropriate fringe."

Examining attentively figure 7 of the plate of Esquimaux Implements, Wea-

* Journal of a Second Voyage for the Discovery of a North-west Passage from the Atlantic to the Pacific. 4to. London, 1824, pp. 498, 548, plate of Esquimaux Implements, Weapons, &c.

pons, &c., where Parry has given a sketch of this ornament specially reserved for the men, we can readily discern that the teeth are the small incisors of the Reindeer, identical with those we have figured in B. Plate V. figs. 8 and 10.

Lastly, it is known that among the same Esquimaux the Molar Teeth of the Seal and the Morse (Walrus), perforated and fastened to the ends of a set of cords, serve as missiles to catch birds in flight, and that these missiles are used in preference to arrows in this kind of hunting*. Nothing, however, as yet has occurred to authorize us to suppose that such a method was employed by the aborigines of Périgord inhabiting the caves we have examined.

We must also accept as having been personal ornaments the fossil marine Shells figured below the Teeth in our Plate B. V. All are pierced with holes as if for suspension; and some indeed have two perforations.

Dr. Fischer, Assistant of the Professor of Palæontology in the Museum of Natural History at Paris, has had the kindness to provide us with the specific determination of these Shells—as many as five species, of which three only are shown by the specimens figured on our Plate. They are easily recognized as having been already in the fossil state when used by the old Cave-dwellers. Not that we should hasten to imagine some special virtue was attributed to them in consequence of their geological age! it is rather to be supposed that, in consequence of their distance from the coasts both of the Atlantic and the Mediterranean, our Aborigines of Périgord found it more easy to procure in the Faluns of the Bordelais or of Touraine these materials of adornment, rather less fresh than if derived direct from the sea-shore, but such as Man has nearly everywhere instinctively sought for. We may add that, although the Stations at which these fossil Shells were found are geographically nearer to the Bordeaux district than to Touraine, yet they seem rather to have been got from the Faluns of the latter than from the former.

"These five species," says M. Fischer, "are very common in the Faluns of Touraine. They are also found, but less abundantly, at Dax and Bordeaux. They

* So also perforated pieces of Walrus-ivory, either squarish or oval in form, and about 1½ inch long, are used by the Esquimaux for the same purpose. They are thus described in the 'Narrative of the Discovery on the North Coast of America effected by the Officers of the Hudson's Bay Company during the years 1836–39; by Thomas Simpson, Esq.' (8vo. London, 1843, p. 156):—"But what most attracted our curiosity was an ingenious and novel contrivance for capturing wild fowl. It consists of six or eight small perforated ivory balls, attached separately to cords of sinew, three feet long, the ends of which being tied together, an expanding or radiating sling is thus formed, which, dextrously thrown at the birds as they fly past, entangles and brings them to the ground." Examples of these slings, brought home by Messrs. Dease and Simpson, are in the Christy Collection.

are, for the most part, absent from the sands of Perpignan, Biot, and the other localities in Languedoc and Provence. Hence I believe they have been taken from the Faluns of Touraine; and, in support of this opinion, I may add that the valves of *Pectunculus* are all worn and rolled; and it is especially in Touraine (at Pont-levoy, Manthelan, &c.) that considerable accumulations of water-worn fossils occur."

The last specimen represented in B. Plate V. is one of the supposed *Whistles*, made of the phalangeal bone of the Reindeer, and one of which we have already figured elsewhere*. Since then, discoveries of this kind of instrument have multiplied in other districts of France, and also under similar archæological conditions. The writers who have treated of them have continued to put the same interpretation on them that we proposed at first.

Fig. 1. This appears to be simply a pebble, the rounded contour and smooth surface of which have been produced by long rolling down the course of a river; for it bears no trace of artificial polish. The pebble has probably been used on account of its almost symmetrical shape, and perhaps also because it was soft enough to be easily bored. It consists of a softish stone, one of the "Metamorphic" rocks of geologists, termed leptinolite, or schistose granulite. It is greyish green in colour, and is speckled with minute black points, which may be imperfect crystals of macle or chiastolite. The bored hole, in the middle part towards the upper margin of the pebble, has been made by working on the two sides of the stone alternately with an instrument acting as a kind of drill; for the hole opens out wide on the two surfaces and is narrow in the middle, where the point of the tool worked. On close examination of the inside of the hole, it can be readily seen that the boring was not done by a mechanical contrivance producing continued revolutions of a tool, but merely by half turns corresponding to the action of the wrist in using some simple drill†. We shall figure in a future Plate of this work several of the little boring-tools or drills of flint, having a blunt point with little facets, by means of which it was very easy to bore bones, and even stones that were not so hard as flint.

The two lines or grooves, diverging from the edge of the hole down to the

* See 'Revue Archéologique,' March 1864, pl. 11. fig. 12.

† Mr. E. B. Tylor, in his 'Researches into the Early History of Mankind,' 1865, has given, at pp. 239–245, some curious notices of the employment of different forms of mechanical drills amongst some savage nations, particularly the Esquimaux. Sir John Lubbock ('Prehistoric Times,' 1865, p. 443) relates the fact stated by Cook, in his First Voyage, "that the New Zealanders succeeded in drilling a hole through a piece of glass which he had given them, using for this purpose, as he supposed, a piece of jasper."

lower border of the pebble, are about one millimetre deep, and have also been cut with a flint-point.

At *a* is a kind of marking of fine striæ, diverging in different directions. It is evident that the pebble has there also been modified by Man's work. At first I supposed that we had here the marks of rubbing produced in sharpening some instrument; but on further consideration I have thought that perhaps the removal of some of the stone, to balance the pebble when hung, the hole not having been bored exactly coincident with the centre of gravity, may account for the abrasion.

We were at first content to figure one side only of this pebble; but several persons having believed that on the other and rather flatter side they could recognize a rough sketch of an animal form, traced in shallow lines, we have reproduced this side also in the accompanying figure. Here also we have further occasion to draw attention to this specimen; for the two oblique lines are repeated on this face, cut to the same depth, but with more divergence. This repetition of the marks, or sign, on the two faces may have had some conventional meaning; and it may suggest to some of our readers the idea of a talisman, or raise some altogether different claim to a symbolic meaning. As for the obscure sketch outline of an animal, we do not try to interpret it; every one is free to decide about it according to his own impression.

This specimen was found at La Madelaine.

Fig. 4.

Perforated Pebble, with oblique grooves and rude outline of an animal.

[The opposite side is shown in B. Pl. V. fig. 1.]

Fig. 2. The Canine Tooth of a Wolf, pierced near the end of its root. The hole does not seem to have been made with a regular drill, but rather by a pointed and cutting flint instrument, used first on one side of the tooth and then on the other, alternately, until the two holes met in one at the centre.

From Laugerie Basse.

Fig. 3. A Lower Canine Tooth of a Wolf, similarly bored through its root. In this case the hole is more neatly rounded, and appears to have been made by a hand-drill worked steadily with long-continued half turns of the wrist.

From La Madelaine.

Fig. 4. An Upper Canine Tooth of a Wolf, pierced at the end of the root. The hole was evidently made with a cutting-implement worked first on one face and then on the other until the elliptically hollow borings met in a small round hole in the middle.

From the Gorge d'Enfer, a Station which we believe to be older than those above mentioned.

Fig. 5. The Upper Canine Tooth of a Fox, bored at the end of the root, which, however, had previously been pared down on its two faces, rendering the work of perforation more easy.

From La Madelaine.

Figs. 6 *a*, 6 *b*. An Incisor Tooth of a large Ox (*Aurochs*?), with the root cut and bored. The two sides of the root have been pared down on its two opposite sides with a very sharp implement; and two holes have been pierced through it, one near the end, and the other near the crown of the tooth. The mouths of the holes are not conical; hence probably the root was pared down after it had been pierced. Six transverse marks have been cut at intervals along one edge of the root (that shown in fig. 6 *b*). As several Bovine Incisors, cut and bored in a similar manner, were found at the same Station and rather near together, it is probable that they were intended to be strung in a row on two cords for some ornamental purpose.

From Laugerie Basse.

Fig. 7. Another Bovine Incisor, in all respects worked like the last, and with the same number of grooves on the edge, and from the same place.

Fig. 8. An Incisor Tooth of a Ruminant, of the genus *Capra* (*Ibex*?), having its root pierced near the end with a hole evidently made by boring from both sides.

From La Madelaine.

Fig. 9. A middle Incisor of a Reindeer, pierced near the middle of the root with a hole made like the last.

From Laugerie Basse.

Fig. 10. A lateral Incisor of a Reindeer, with its root bored with a very round hole which must have been carefully made with a stone drill having a finely worked point. Such perforated teeth as this we have already noticed (p. 42) as being used by the Esquimaux in a kind of head-dress, of which Capt. Parry has given a figure.

From Laugerie Basse.

Figs. 11, 12, and 13. These three Teeth, pierced through the middle of the naturally large and flat root, are the Canines of a Ruminant of the genus *Cervus*. They much resemble those of the common Red Deer (*Cervus elaphus*); whilst they notably differ from the Canines of the female Reindeer,—the only ones that I have observed in place, not having had the opportunity of ascertaining directly the form of those of the male Reindeer. Whatever they are, these perforated teeth must have been in fashion at the period with which we are concerned; for they have been found in many districts of France, and sometimes in large numbers at one place; and this may lead us to suppose they had been used as necklaces, or for some such decoration.

The specimen fig. 11 is from La Madelaine; fig. 12 from Laugerie Basse; and fig. 13 from Les Eyzies.

With regard to the several Teeth above described, we must again mention that some of them were probably used for ornament only, or for dress, and that others may have been preserved as memorials of hunting. Thus among the Kuskuchewak, says Sir John Richardson ('Arctic Searching Expedition,' 2 vols. 8vo. London, 1851, vol. i. p. 368), "Every hunter preserves some remembrance of each Reindeer that he kills. He either scratches a mark on his bow, or draws out a tooth of the beast, and adds it to a girdle which he wears as an ornament"*.

Fig. 14. Inner half of a Boar's Lower Canine, split longitudinally. We have thought right to figure this specimen, though it bears no other indication of Man's work than having been neatly slit along its length. Such plates or flakes of teeth are still used for ornament, particularly by the Arabs, who fasten them

* This custom obtains also among our modern sportsmen; for instance, those who have retained the privilege, now very rare in France, of hunting the Stag, do not forget to pluck out the canine teeth of the slain deer; and they call them "Crocs" or "Diamants." Instead, however, of making a hole in them for stringing, they set them in gold as sleeve-buttons, or as cravat-pins. In sporting circles the ladies wear these Deer-teeth in bracelets; and we have heard even of a handsome necklace or *Rivière* entirely composed of these "Diamonds of Venery."

crosswise as breast-pieces on their horses. We cannot say to what use the half-tooth before us may have been put.

We may mention that the remains of the Boar are found very rarely indeed in the ancient Stations of the Reindeer-Age; and nothing has yet occurred to indicate that this animal served for food to the aborigines of that period.

From La Madelaine.

Fig. 15. This is a Cowrie Shell (*Cypræa*), already fossilized when used, probably for ornament, by the early natives of Périgord. The large cavity near its outer edge is due to accidental fracture; but above, near the opening, there is a trace of a hole artificially made. This shell must have come from the Faluns of Touraine, according to M. Fischer (see page 43), who refers it to *Cypræa pyrum* of Gmelin (*C. sanguinolenta*, Dujardin).

From La Madelaine.

Figs. 16–19. These are valves of *Pectunculus glycimeris* (Linnæus and Dujardin), of different sizes. Fig. 16 shows a specimen with only one hole for stringing; the three others have two such holes (one near the hinge, the other at the opposite border of the shell), so that they were probably strung in a different manner.

From La Madelaine.

Fig. 20 is a valve of *Arca Breislaki* (Basterot and Dujardin). Instead of showing its inner face, this shell is figured so as to show the single hole with which its umbo has been bored.

From La Madelaine.

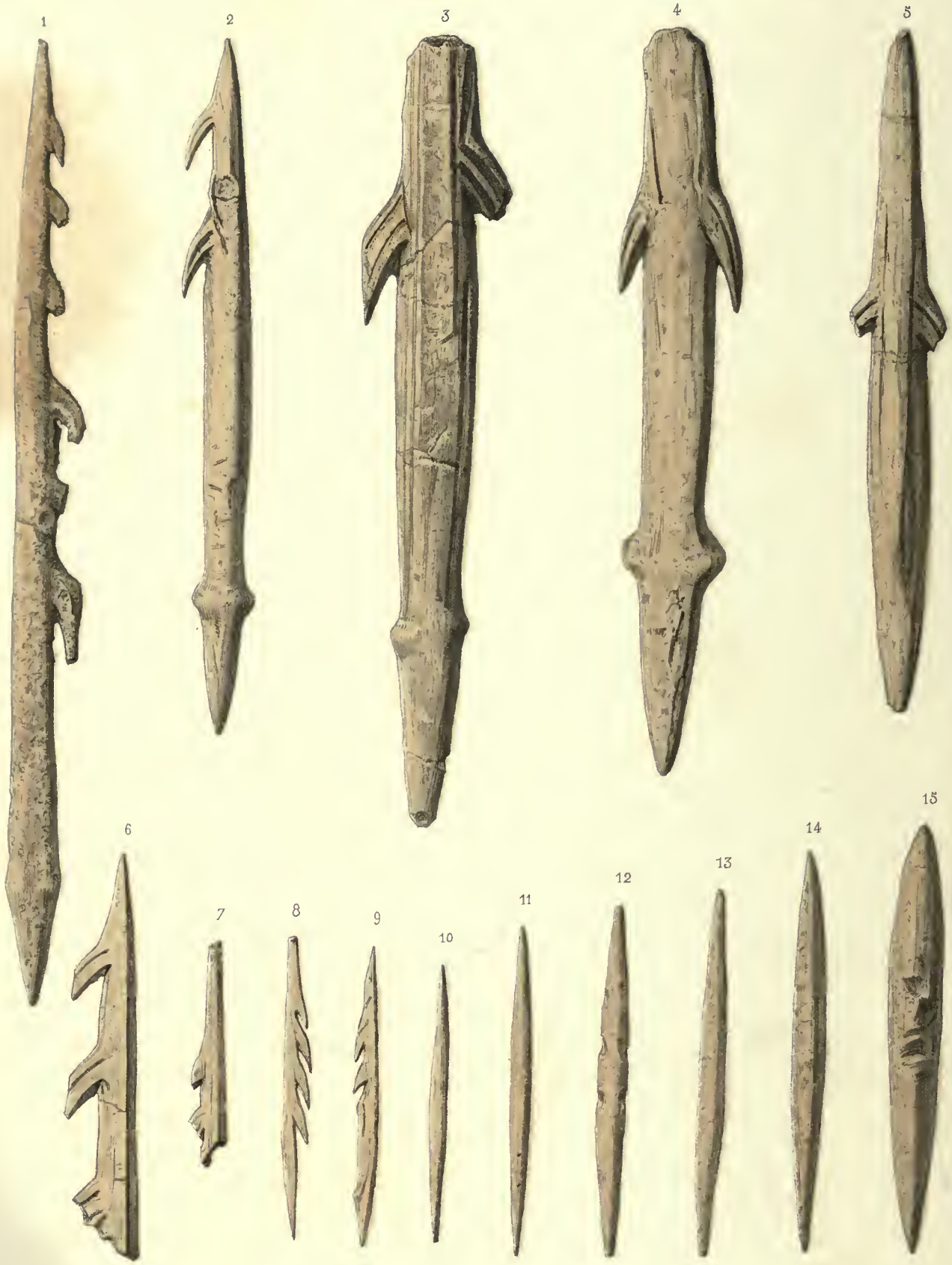
Fig. 21. The First Phalangeal Bone of a hind foot of a Reindeer, with a hole on its lower face, penetrating only into the cavity of the bone, and not going through and through. This we have termed a Whistle; for on applying the lip to the hollow of the proximal (metatarsal) articulation, and blowing obliquely into the hole, we get a sharp sound analogous to that produced by a cat-call, or a key used as a whistle. The first of these Whistles was observed in 1860, in the burial-cave of Aurignac; but, as that was then an isolated observation, I thought it prudent not to publish an account of it. Since that time, however, there have been many discoveries of this kind of instrument in different places; and now specimens are not rare in collections.

From Laugerie Basse.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. VI.



Louveau del. et lith.

Imp. Becquet à Paris.

B. PLATE VI.

In our description of B. Plate I., illustrating several Bone Implements, of different sizes and usually regarded as Heads of Arrows or Harpoons, we stated (page 10) that in a subsequent Plate we would figure some implements having a still more distinct appearance of having been used in Fishing. Several of the instruments shown in B. Plate VI., and about to be described, are subcylindrical pieces of Reindeer-horn, pointed at the ends, and armed on one side with sharp recurved teeth, or barbs; and they thus resemble certain Fishing-Implements which are in use among the natives of different countries, and which have been nearly always termed Harpoons by travellers who have figured or described them from the originals. We proceed, then, to reproduce, in woodcuts, some examples of these implements, of different ages and countries, to show that, however great the distance in time and space, there is throughout, even in minute details, a striking analogy, and even identity, in the mechanical resources invented by man to supply the first necessaries of life.

Nevertheless we must allow that resemblance, and even identity, in form does not always unmistakeably imply a similar mode of use for the weapon or implement.

Thus with the specimens shown in the annexed woodcuts, and termed "Harpoons" by the authors from whose works they have been copied, are two *harpoon-like* implements (figs. 5 and 6) made of Reindeer-horn by the North-American Esquimaux. In one of these (fig. 5) the spike or point is made of the same piece as the shank; in the other (fig. 6) the top of the shank is hollowed so as to receive, in a socket, a point or armature, of a mineral nature, iron or worked stone (we have not been able to determine which, the specimen having come to us without its moveable point). These two *harpoon-like* implements were each firmly set in a shaft of light wood (deal or birch); and we were obliged to detach them, to examine the mode of their insertion. Now, the other end of the shaft is feathered on two sides, and notched at the butt, to fit on a bow-string. Hence these pointed implements with barbs on one side, such as we have from Périgord, are now used as *Arrow-heads* by the Esquimaux; and there is much uncertainty as to the actual mode of use of objects similarly shaped, which we find in the Caverns and other ancient Stations of Dordogne and the Pyrenees.

The analogy is repeated also in the indications of the method of setting the

Fig. 5. *Fig.* 6. *Fig.* 7. *Fig.* 8. *Fig.* 9. *Fig.* 10.

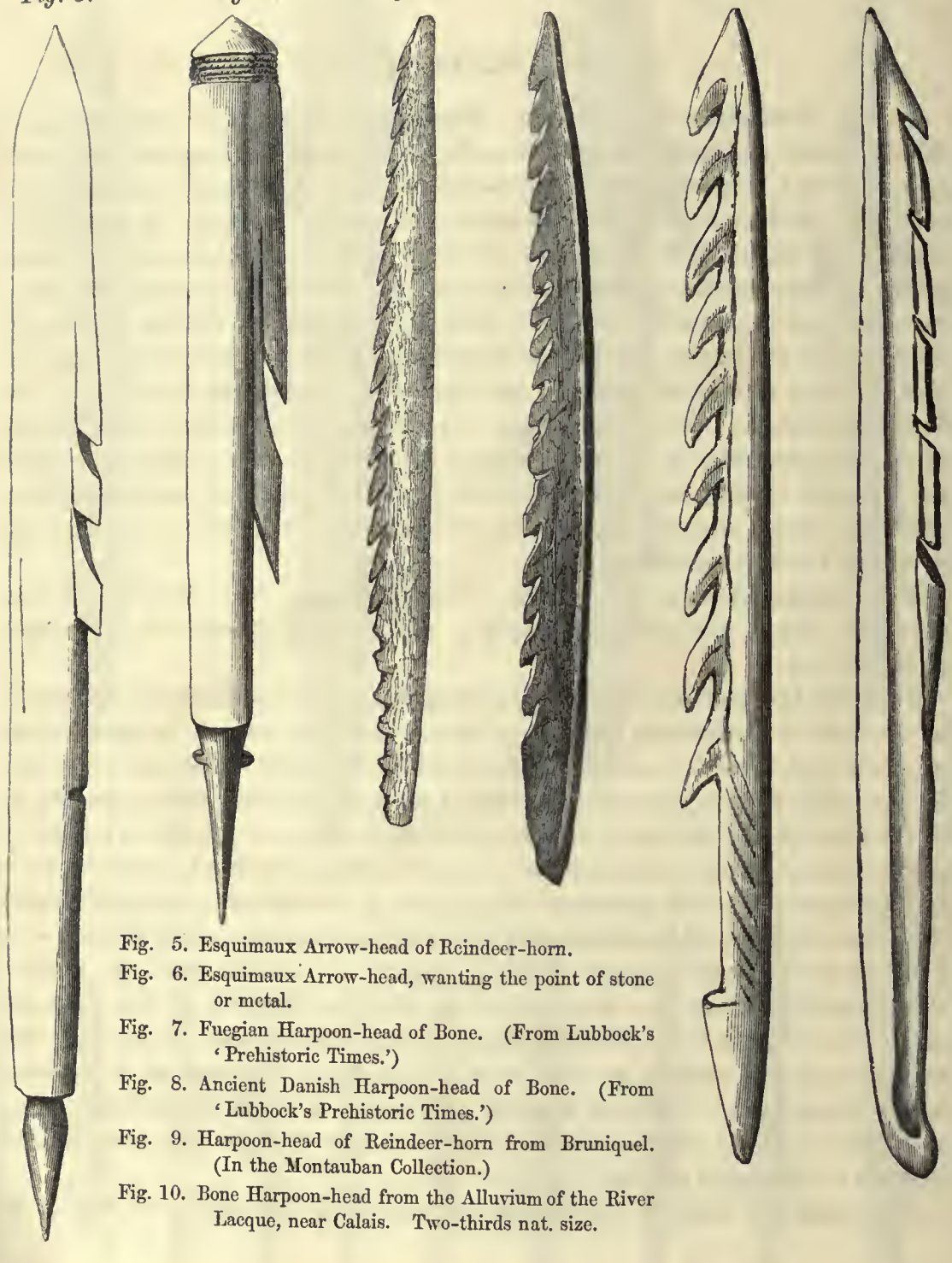


Fig. 5. Esquimaux Arrow-head of Reindeer-horn.

Fig. 6. Esquimaux Arrow-head, wanting the point of stone or metal.

Fig. 7. Fuegian Harpoon-head of Bone. (From Lubbock's 'Prehistoric Times.')

Fig. 8. Ancient Danish Harpoon-head of Bone. (From 'Lubbock's Prehistoric Times.')

Fig. 9. Harpoon-head of Reindeer-horn from Bruniquel. (In the Montauban Collection.)

Fig. 10. Bone Harpoon-head from the Alluvium of the River Lacque, near Calais. Two-thirds nat. size.

Fig. 12.

Fig. 11.

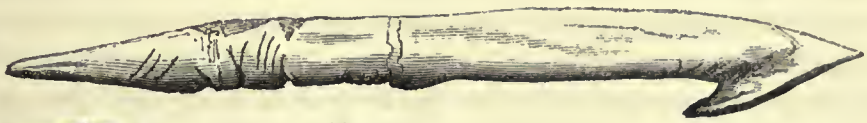


Fig. 13.

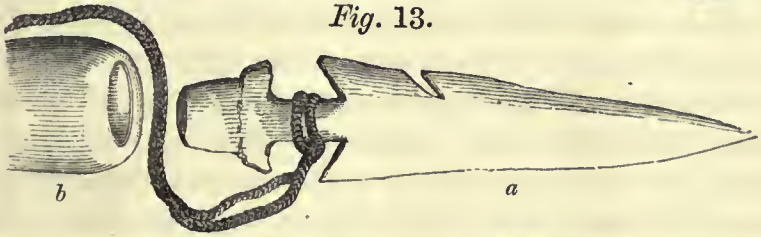


Fig. 15.

Fig. 14.

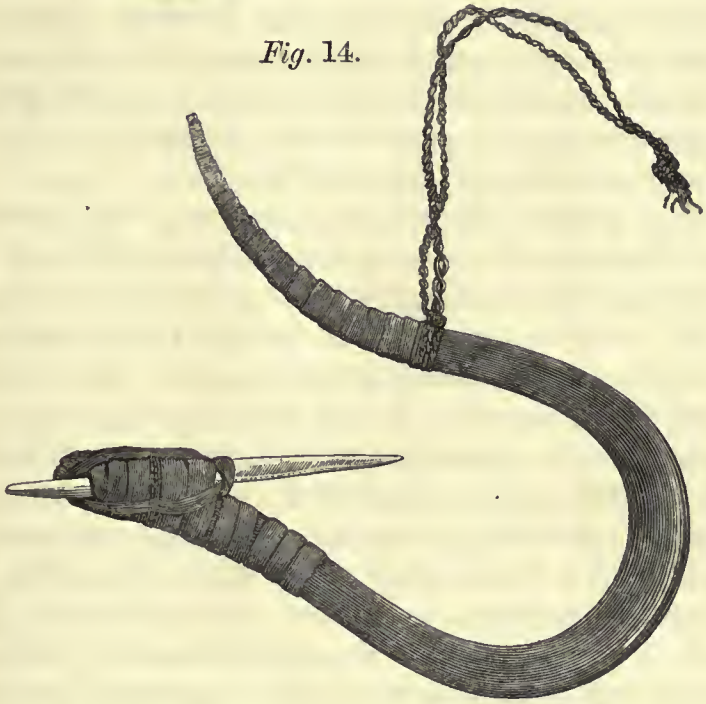


Fig. 11. Harpoon-head of Stag's Horn from the Lake-Station of St. Aubin: of the Stone-Age. (In M. Mortillet's Collection.)

Fig. 12. Harpoon-head of Bone from the "Drift," Lake Superior, North America.

Fig. 13. Esquimaux Harpoon-head of ivory (*a*), and the socket for it in the ivory head of the shaft (*b*). (Christy Collection.) Nat. size.

Fig. 14. Fishing-Implement from Nootka Sound.

Fig. 15. Arrow-head of Bone, with a barb of whalebone, from Oriental Siberia.

weapon in its haft or handle. In a former memoir* an attempt was made to explain the probable mode of inserting the supposed Arrow-heads, barbed on two sides, in a socket, and of attaching them to the haft by means of cord tied on above the two knobs always present at the lower end of the stem, just above the pointed lower end, which is tapered for insertion in the haft (see also above, page 10). These two little projections, or knobs, are present also in one of our modern Esquimaux Arrow-heads (fig. 6); and they are here even more prominent, and fit firmly into two corresponding little hollows made in the inside of the socket, the wall of which is very thin and tightly bound with a ligature of thread made of Reindeer's tendon, giving great strength to the socketing. In the other Esquimaux Arrow-head the point of insertion is simply thicker or swollen a little above the tendon-bound socket.

In the same page with these two Esquimaux Arrows we have represented two specimens that without doubt are more properly termed *Harpoons*; and these figures we have been kindly permitted to copy from Sir John Lubbock's highly interesting and instructive 'Prehistoric Times'†.

One of these Harpoons (fig. 7), made of bone, is copied from the figure 156, page 436 of 'Prehistoric Times.' It is one of those still in use among the natives of Tierra del Fuego (Fuegians). The stem is bluntly pointed; and is barbed, on one side only, with sixteen close-set oblique barbs, arching backwards, not prominent, and formed by simple oblique grooving. The lower part of the stem, corresponding nearly in extent to the usual tapering butt with knobs in our Dordogne specimens, is marked below the barbs, and on that edge only, with five or six irregular notches and accompanying low angular projections, for which there could scarcely be a use except in aiding to fasten the implement on its haft.

At page 80 of Sir J. Lubbock's work there is an illustration (fig. 95) of another bone Harpoon, of analogous form. This we reproduce in fig. 8, page 50. It belongs to the prehistoric times of Denmark, has sixteen barbs, on one side only, as in fig. 7; and in some details of form it approaches rather more nearly our supposed Harpoons from the ancient Stations in Southern France, which indeed have generally been more carefully worked, as may be very fully verified by reference to the Harpoon from Bruniquel, represented by fig. 9.

This Harpoon (fig. 9), which M. Brun, Conservator of the Museum of Montauban, has authorized us to have figured, was found by him in the deposit under the Rock Shelter near the Château of Bruniquel (Tarn et Garonne), which he has

* Annales des Sciences Naturelles, 4e série, Zoologie, vol. xv. p. 210

† Prehistoric Times, as illustrated by Ancient Remains and the Manners and Customs of Modern Savages. 8vo. London, 1865.

worked with great intelligence and good success. It is formed of Reindeer-horn, as are most of those belonging to the "Reindeer-Age." Its upper point is short, as in that from Denmark. The side-row of barbs does not reach so far down; and there are only nine; they are more detached from the stem, more regularly spaced apart; and all are hollowed on both their faces with that middle furrow or groove characteristic of the Arrows and Harpoons belonging to that period. It has been thought that the grooves cut on these barbs of the weapons of the Reindeer-Age have been made to carry poison (see page 10). Without insisting on the value of this hypothesis, we may repeat that this practice of smearing arrow-heads with a substance intended to increase their destructive power has existed at all times and in all countries. To the instances cited elsewhere, we will add that related by Gmelin, in his 'Travels in Siberia'*. He says that the Tongouses of Nijnaia Tongouska attribute an analogous quality to the burnt flesh of the Woodpecker. "They roast this bird, pound it, mix it with fat of any sort except Bears' fat (because that decomposes readily); and with this mixture they smear the arrows they use in hunting. An animal struck with one of these always falls with the wound." In this Harpoon from Bruniquel there is only one knob near its lower end; it is on the same side with the barbs, as is frequently the case in the Harpoons with barbs on one side only.

The Harpoon, fig. 10, page 50, is engraved two-thirds of its real size. It is made of a very compact bone of some Herbivore. There are five barbs, on one side only, wide-set, and formed by simple oblique grooving. This Harpoon, the age of which has not been determined, was found near Isherque (department of Pas-de-Calais), at a depth of three metres, in the alluvium of the little River Lacque. For the original drawing we are indebted to Mademoiselle E. Watelet, by whose talent the great work of her father Professor Watelet, of Soissons, on the 'Tertiary Flora of the Paris Basin,' has been enriched with many plates.

Another Harpoon (fig. 11, of actual size, page 51) has but a single barb, and appears to consist of Stag's horn. It was discovered, together with many others, by Dr. Clément, at St. Aubin, one of the Swiss Lake-Stations referred to the Stone-Age,—a fact giving us a relative age for this specimen. It forms part of M. Mortillet's Collection, who has kindly permitted us to have it drawn.

Another specimen, with large oblique barbs very far apart, is shown by fig. 12, page 51, two-thirds its real size. It is made of the bone of a Herbivore; its upper end is obtuse; its other extremity is cut square and bored with a hole for attachment or suspension. This Harpoon, said to have been found in the "Drift"

* Gmelin, 'Voyage en Sibérie.' Traduction française. 12mo. Paris, 1767, vol. xi. p. 113.

of Lake Superior, North America, was given to our learned friend M. Barrande, who has obligingly placed it at our disposal.

Lastly, we give fig. 13 as a comparative specimen, from the late Mr. Henry Christy's Collection, being the head of an Esquimaux Harpoon for hunting the Sea-Otter. It is made of Walrus-ivory, is $3\frac{1}{8}$ inches in length, and has a blade like that of a long triangular arrow-head, but is further barbed by a notch low down on one edge. Its short shank below the blade is cut away so as to have a thick compressed rim or collar, below which the butt tapers to fit a socket in the head of the shaft, and above which is fastened the cord of plaited tendon, connecting it with the shaft. The latter consists of two parts,—a head of ivory or hard bone, 8 inches long, hollowed at the top to receive the armed point, and firmly spliced by fine cord of sinew to a rod of deal, 3 feet $2\frac{1}{2}$ inches long, feathered on three sides at its lower end, but not notched or "crutched" to fit a bow-string. Altogether this "Sea-Otter Harpoon" is 4 feet $1\frac{1}{2}$ inch long. The cord connecting the moveable head and the shaft is about 5 feet long, and is double for about two feet, as it is attached to the shaft at two places—just between its upper and middle, and its middle and lower thirds.

In the same Collection is an Esquimaux "Sea-Otter Arrow," made on the same plan as the foregoing, only 3 feet long altogether, three-feathered, "crutched" for the bow-string at the butt, and furnished with a small sharp harpoon-like head ($1\frac{1}{2}$ inch long by $\frac{3}{8}$ inch broad), with three barbs on one side only; it fits into a socket, and has a hole drilled through its base for fastening the cord (here 6 feet 3 inches long) which attaches it to the shaft.

Thus we see, in the two last-mentioned Esquimaux Fishing-Implements, the *arrow-headed* instrument adapted as a Harpoon, and the *harpoon-like* head belonging to an Arrow (see also page 49). In either case the barbed head inserted in the head of the shaft, whether shot at the prey or hurled by hand, would be readily disengaged, and the shaft, attached by the cord, would remain floating (in a transverse direction, owing to its being attached at two points), to indicate the direction taken by the wounded animal, and to impede its retreat.

Other applications of bone points, barbed on one side only, are seen in variously modified Fishing-spears used by the Esquimaux (Tschukses) of North-eastern Asia. Here such barbed pieces, but usually slender, and more curved than those of the Caves, are fastened at the end of a wooden shaft, either singly, or in groups of three or four, with the concavity and the barbs inside; and others, similar but shorter, are grouped around the shaft, about halfway down, with their points upwards and their barbs inwards.

In B. Plate VI. there are also other supposed Fishing-Implements,—namely harpoon-like weapons, barbed on one side, similar to those above-mentioned, but diminutive, and, as it were, in miniature rather than fit for real use. They may, however, have been used as Arrow-heads.

There are also figured in the same Plate some small rod-like pieces of bone, sub-cylindrical, and tapering at both ends (figs. 10–15). Mr. Henry Christy thought that these little bone spikes, or spindle-shaped and skewer-like implements, may have been used by being tied on obliquely to the end of a longer stick or stem, after the fashion of a Fish-hook. He possessed in his Collection modern Fish-hooks so made, by the fastening together of two pieces of bone, unequal in length, at a sharp angle. Sir John Lubbock has also some, which were presented to him by a person who saw them in use among the natives on the north-west coast of America.

Mr. H. Christy also thought it highly probable that these spikes of bone may have been used in the construction of some such kind of Fish-hook as is used at Nootka Sound at the present day, and many examples of which are to be seen in his own and other Collections. Such thin tapering pieces of wood or bone are tied securely, at a certain angle, on the thicker part, and within the curve, of a stick bent like a shepherd's crook. Sometimes the spikes are sharp at both ends, but more often they are blunt at the outer end. Sometimes the framework is of solid wood and the spike or tongue of iron. These curious fishing-implements are of different sizes; a small one is drawn in fig. 14. How they are used, except that they are suspended by a line attached to a certain point nearly in the middle of the upper part, we have no certain knowledge.

We must, however, also remark that in an Arrow-stem, made of a kind of reed, which has been given to us as coming from Oriental Siberia, the terminal armature consists of a simple spike or sharp rod of bone (probably the bony ray of the back-fin of some large fish), rounded and equally pointed at both ends (fig. 15). One of these points is set in the hollow shaft, and is tightly held by a ligature round the edge of this natural socket. We may add that in these kinds of Arrow-heads a piece of Whalebone attached to the stem a little below the point, and spreading out at its end, serves as a barb to retain the weapon in a wound. This is well shown in the annexed sketch (fig. 15), of the actual size. It is true that the analogous specimens represented in B. Plate VI. are much smaller; but we shall in the sequel have occasion to figure some of larger size. Whether or not these support the interpretation proposed at first, it is probably the best at all events for the two-pointed instruments figured in B. Plate VI., of which we now proceed to give a detailed description.

Possibly, however, some of the more slender of these skewer-like instruments may have been used as Pins, for fastening dresses and skins used as curtains or otherwise.

Fig. 1. An Harpoon-head, with a slender shank; one of the longest that have been found at the Stations in Dordogne. Its point is broken, but has been neatly tapered and sharp. The shank or stem has on one side six barbs, wide apart, with nearly equal interspaces, and gradually increasing in size from above downwards. The lower end suddenly tapers to a point for insertion in a socket; and at two centimetres above this pointed end there are, one on each side, two swellings or slight elevations, answering to the two knobs noticed on other specimens, such as those figured in B. Pl. I. This Harpoon, like most of those about to be described, is made of Reindeer-horn, and is almost wholly coated with a thin, blackish, calcareous incrustation, obscuring the shallow grooves or channels on the faces of each barb, which are usual on most of these old Harpoons and Arrow-heads.

From La Madelaine.

Fig. 2. Another Harpoon, with only two barbs on one side. The top has been carefully tapered to a point. The points of the barbs are at a greater distance from the stem than in fig. 1; and the grooves are deeply cut, especially in the second barb. The shank is slightly curved, with an evident swelling at the middle; and near the butt it has two prominent knobs, to aid in fastening on the haft, or to hold on a string, connecting it loosely with the shaft.

From La Madelaine.

Fig. 3. This specimen has perhaps been wrongly figured among Implements referred to the category of Harpoons properly so called; for it is easy to see that it has been accidentally broken where its upper end has been roughly retouched, without the marks of the fracture being quite removed. It is noticeable also that the lines cut along the stem continue as far as the broken end, and have extended further. Hence this specimen may have originally been longer, with many barbs on each side. There remain now only two barbs, one on each side, thick and strong; and each of them shows two parallel grooves. The shank is thick, tapering downwards below the barbs until it swells slightly with the two usual knobs for holding a string on, and is then pointed for insertion in a haft.

From La Madelaine.

Fig. 4. We cannot propose for this the interpretation offered for the preceding specimen. On the contrary, its shape, though exceptional, is the result of a premeditated plan. Its upper end is cut away on two faces, thin and wedge-like, with rounded corners. The two barbs with which it is armed are set on opposite to each other, not far below the flat tapering point; they are unequal in size, are marked with the characteristic median groove, and do not stand out with an open angle from the stem. Below the barbs the stem is thick; but it tapers gently towards the two knobs, which are more prominent than usual.

It is difficult to determine the exact use of this Harpoon, made with comparatively a considerable amount of care, and to which it would have been easy to give a sharp point instead of the rounded flat edge, ill adapted, we should think, to pierce the skin of a Reindeer or even to wound a Fish.

From La Madelaine.

Fig. 5. This also presents a form different from any other specimen we have as yet seen. The upper part in advance of the two barbs, cylindrical but tapering to a blunt point, is extraordinarily long. The barbs are opposite, unequal, and broken; they have the usual median groove. The stem swells out in its lower half, below the barbs, and tapers down to the point for insertion in the shaft without any of the usual knobs or prominences. It is true that on the side opposite to that figured there is, low down on the stem, a flat surface, which may give rise to the supposition that this implement may have been fixed by a ligature to a shaft or handle.

From La Madelaine.

Fig. 6. In this we have only the sharp upper part of a Harpoon, with barbs on one side, almost transverse in direction, and marked with the usual median groove.

From La Madelaine.

Fig. 7. A fragment of a slender long-pointed Harpoon, barbed on one side. The point, the barbs, and the stem are all broken.

From La Madelaine.

Fig. 8. A small specimen cut in the shape of a barbed Harpoon, with a long point, which has been broken. There are four barbs on one side only, distinctly separate, sharp, and very oblique, but without the usual grooves. The lower part tapers to a point without any indication of knobs.

This diminutive weapon-head may have served as an Arrow-head. We have

elsewhere* figured another, still smaller miniature Harpoon (?) of this sort, which was found imbedded in the breccia of the Cave at Les Eyzies.

From La Madelaine.

Fig. 9. Another minute Harpoon-like head, of similar dimensions to the last, but showing only two barbs cut distinctly, whilst above them two others are indicated by shallow, oblique, unfinished notches. This specimen has preserved its sharp point. Near the pointed butt there is a kind of notch, which may have been of use in fastening this little weapon on a shaft.

From La Madelaine.

Figs. 10 to 15 are the two-pointed subcylindrical spikes, or skewer-like pieces, of Reindeer-horn, referred to above, page 55. Their use is uncertain. Mr. Henry Christy thought that they may have formed part of Fish-hooks, having been tied on to other bones or sticks obliquely, as already described (page 55); and indeed in the specimen fig. 12 there are notches made at intervals along the stem; and one of its ends is flattened on one side, so as to allow of its being laid against another piece and tied securely on†. Fig. 15 is longer and much thicker than the others; and one end is thicker than the other. It bears some rough notchings near the middle.

From La Madelaine.

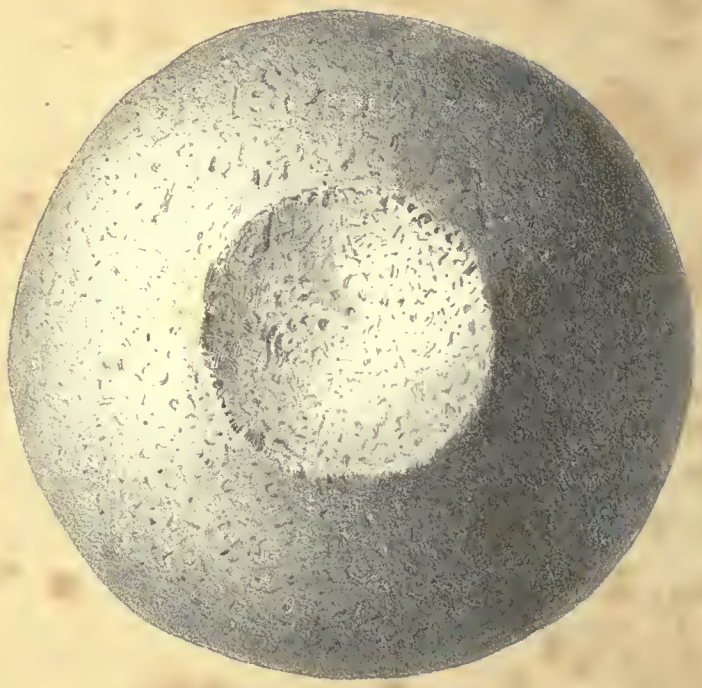
Although the specimens figured in B. Plate VI. were all got from the hearth-stuff at La Madelaine, yet similar Implements are not wanting in our other Stations in Dordogne. We have indeed precisely similar specimens from the Cave at Les Eyzies, and from the Rock-shelter of Laugerie Basse. From the Lower Cavern of Massat (Ariège) we have also got Barbed Harpoons and Arrow-heads, of the same type‡. We are also able to cite the fine specimens of the same kind found at Bruniquel by M. Brun, who has kindly authorized us to have a drawing made of the Harpoon figured at page 50. The specimens from La Madelaine, however, being more perfect, and more varied in form, we have naturally preferred to figure them for the purposes of this publication.

* Revue Archéologique, April 1864, p. 247.

† These bone spikes, lashed on obliquely by their middle to the bevelled end of a shaft, may also have served for both point and barb of a dart, such as the Australians make out of a long stick and a Kangaroo's fibula sharpened at both ends.

‡ Quart. Journ. Geol. Soc. London, vol. xvii. p. 470, fig. 4.

1



2

Louveau del. et lith.

Imp. Becquet à Paris.

A. STONE IMPLEMENTS.

A. PLATE XIII.

The two specimens here figured are examples of the hollowed pebbles of granite found in the Cave at Les Eyzies, and referred to in Lartet and Christy's Memoir on the Caves of Périgord in the 'Revue Archéologique,' April 1864.

These rounded water-worn blocks, or pebbles, bearing a shallow pit ground out on one of their flatter sides, have been found in considerable numbers at La Madelaine and Les Eyzies. They are mostly of granite; but a few (three or four) of quartzite have occurred; and one or two of sandstone. One very small quartzite specimen was met with at the Gorge d'Enfer, and one of larger size at Laugerie Basse. These pebbles vary considerably in size (from less than two to eight inches in breadth), and, the larger specimens especially, besides being flattish, are more or less oval*. Sometimes the excavation is very slight, little more than a mere flattening of the middle portion of one of the broad faces; and sometimes it is deep enough to serve as a kind of Mortar. It appears to have been made by a continued or repeated grinding with other hard substances; and its surface is not polished, but rough, according to the crystalline and granular texture of the granitic rock.

The use or uses to which these hollowed stones† could have been applied are rather doubtful. Some are large enough to have been used in the beating or

* The specimens of different sizes may be easily arranged as a pyramid of rough globes, one on another, the largest at the bottom, and the hollowed face of one receiving the naturally rounded base of the next above. It is improbable, however, that the fancy of the Aborigines would have led them to make such an ornament or plaything; and the occurrence of one specimen on another is not authenticated. Nor does it seem to have been the intention to give a mere flatness to the stone, so as to make it lie steady when used as an anvil, chopping-block, or such like; for the ground surface is always hollowed to a greater or less extent; and there are no marks of blows on the opposite and convex face, still in its natural condition.

† In the 'Revue Archéologique' for April 1864, we quoted Dr. Roulin's suggestion that they may have served the Aborigines in the production of fire by friction, in the way followed by some American Indians (Oviedo, 'Hystoria general de las Indias,' Lib. vi. Cap. 5), namely by twirling the end of a dry stick rapidly in the rough hollow of such a stone. A stone, however, does not appear to have formed a part of the apparatus. For descriptions and illustrations of such methods of fire-making, see Mr. E. B. Tylor's 'Early History of Mankind,' pp. 236–259. Sir John Lubbock also makes several interesting allusions to this subject in his 'Prehistoric Times,' pp. 353, 380, 400, 421, 453, &c.

grinding of small parcels of grain or other food, or for rubbing the materials of paint, poison, &c.; but some of these stones seem too small even for such a purpose; and, if these rough-grained bowls had been used in the preparation of a paint of red ochre or hematite, we should expect still to find some distinct traces of its persistent reddish-brown tint. The Indians on the Upper Amazon actually use, we are told, mortars analogous to those from Périgord in grinding and preparing their red pimento.

We have been informed that lately in Northern California there have been found in the auriferous alluvium*, containing the bones of Mastodon, and underlying the ancient sheets of basaltic lava, some hollowed Mortar-like pebbles similar to these under notice from Les Eyzies, and that these were accompanied by pestles of stone. M. l'Abbé Bourgeois has indeed shown us two of these pestles; one is of greenstone, and the other of a hard, black, white-veined stone, highly polished, and bored at one end with a hole for suspension or some other use. M. Simonin also, a member of the Geological Society of France, tells us that, in his travels in California, he has often seen on rock-surfaces hollows (similar to those on the pebbles from Dordogne) that have been made by the Indians to be used as mortars for grinding the maize into a kind of flour, which they mix with a little water and eat cold.

Stones hollowed for use as Mortars or Mealing-stones, and round, oval, cylindrical, and other stones for Corn-crushers, are frequently mentioned in the descriptions of the Lake-dwellings of Switzerland; but flat slabs, not pebbles, seem to have been always chosen for these cupped or hollowed stones of Switzerland, as is still the case in Africa and elsewhere. (See J. E. Lee's Translation of F. Keller's 'Lake-dwellings of Switzerland,' &c., 1866, pp. 25 &c.

No definite pestles have been found with these Mortar-like stones of Les Eyzies and La Madelaine; but some oval flattish pebbles of quartz, found in the Caves, and worn on the edge by having been used as knapping- or chipping-stones†, fit sufficiently well to the concavity of some or other of the hollowed pebbles to

* At page 252 of his Report on the Geological Survey of California, "Geology," vol. i. (1865), Mr. J. J. Whitney alludes to the works of Man having been frequently found in this gold-bearing gravel, together with bones of Mastodon and Elephant; and in 'Silliman's American Journal of Science and Arts' for November 1866, a Human Skull is reported to have been found in this very old valley-gravel.

† The Knapping-stones, for chipping flints and other materials, whether consisting of natural flattish pebbles of hard rock or of dressed stone, usually have, on one or more surfaces, little hollows for the fingers and thumb; but in many specimens from our Caves and elsewhere these pits have been chipped out and remain rough. A small round pebble of granite, from Les Eyzies, has been thus adapted and used; for it

serve also as rubbers or pestles. There is also one flattish oval pebble of dirty-red jasper, found at La Madelaine, which has been much worn by grinding, having on each face an obliquely flat patch of polished surface.

In the British Museum are several stone Mortars from Bruniquel. They are irregularly saucer-shaped, larger than any of the hollowed pebbles above mentioned, and consist of roughly dressed blocks of limestone, with a large, oval, shallow depression ground out of one surface. A piece of mica-schist, somewhat like the butt-end of a pistol in shape, from the same cave, seems to have served as a Pestle.

Fig. 1. A smooth round pebble of fine-grained grey granite, slightly hollowed on one of its flatter surfaces. The pebble is $3\frac{1}{2}$ inches (89 millimètres) wide in its greatest diameter, and was probably $3\frac{1}{12}$ inches (79 millims.) thick. The excavation ground out on the top is about $\frac{1}{3}$ inch ($8\frac{1}{2}$ millims.) deep from the original surface, and about $\frac{3}{12}$ inch ($6\frac{1}{3}$ millims.) deep below its present edge, with a diameter of $1\frac{1}{2}$ inch (38 millims.). From the lip of the hollow to the opposite face, the pebble is $2\frac{10}{12}$ inch (73 millims.) thick.

The old surface of the stone had acquired a pinkish tint, which is seen at the edge of the depression to penetrate the pebble for about $\frac{1}{8}$ inch ($3\frac{1}{4}$ millims.); but the hollow itself, as is generally the case with these cupped pebbles, whether of granite or quartzite, has a fresher, rougher, and whiter surface than the rest of the stone, having been made subsequently to the old discoloration of the pebble.

Fig. 2. A smooth subovate flattish pebble of grey granite, with a broad round pit ground out on one of its flat faces. It is rather coarser in grain than the specimen above described (fig. 1). It is noticeable that in this specimen, contrary to what is observed in the specimen described above, the surface both of the pebble and its cup has a dull pinkish tint, due possibly to a ferruginous stain derived from the brown materials of the hearth-stuff in which it has been imbedded. As the bowl or hollow is not more deeply stained than the rest of the pebble, the discoloration can scarcely be due to any ochreous pigment

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has had a little pit chipped out on its surface, and its edge bears the marks of knocking. Possibly in some cases the hollow of the Mortar, also, was commenced by chipping, but was afterwards ground down more smoothly. A small, round, smooth pebble of sandstone (fine-grained, compact, cream-coloured, and slightly micaceous), from Les Eyzies, has a little pit chipped out on one face.

having been ground in it; but why it should have been stained at all, when others are not, it is difficult to say, unless it happened that some of the pebbles lay with the bowl upward, which thus became stained by the downward percolation of water, and others, in a reverse position, remained unaffected.

This pebble is $5\frac{3}{8}$ inches ($130\frac{1}{2}$ millims.) broad in its greatest, and $2\frac{1}{6}$ inches (55 millims.) in its least diameter. The hollowed surface was originally almost flat. The pit is $2\frac{1}{2}$ inches (64 millims.) broad and $\frac{1}{2}$ inch (13 millims.) deep.

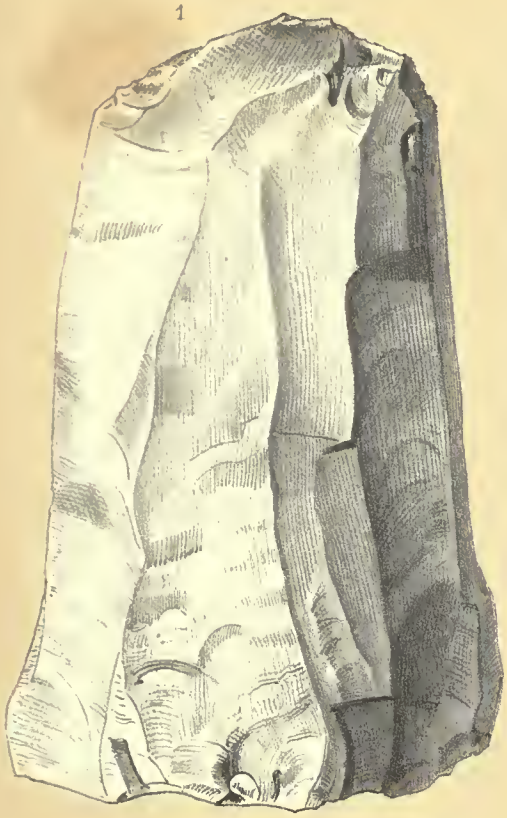
Some of the Lamp-stones of the Esquimaux are flattish-oval in shape, and excavated on one face, like fig. 2 and other specimens; but the hollow is mueh larger and deeper in proportion, and the stone of which they are made is softer. One such Lamp-stone (from Russian America), 6 inches (153 millims.) long and 5 ineheс (127 millims.) broad, has a cavity 4 inches (102 millims.) long, $3\frac{1}{4}$ inches (83 millims.) wide, and 1 inch ($25\frac{1}{2}$ millims.) deep.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XIV.

1



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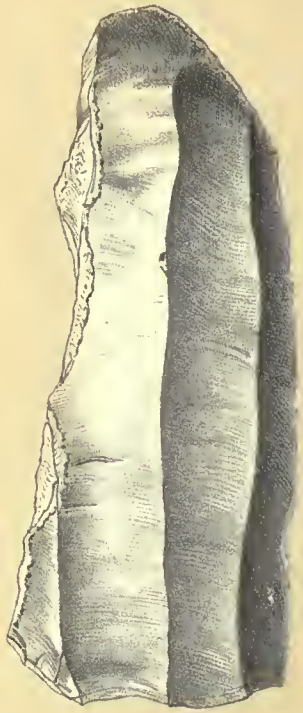

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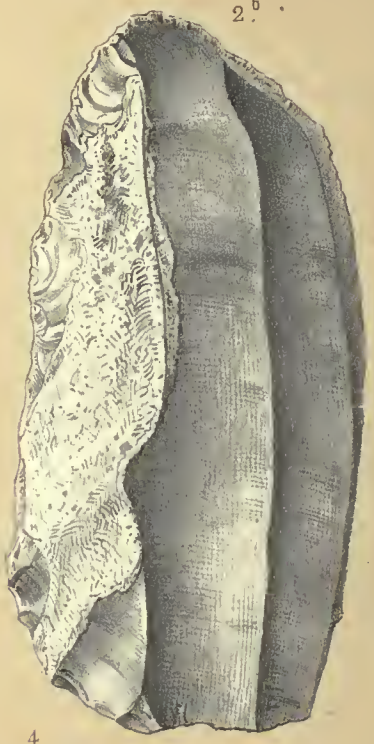

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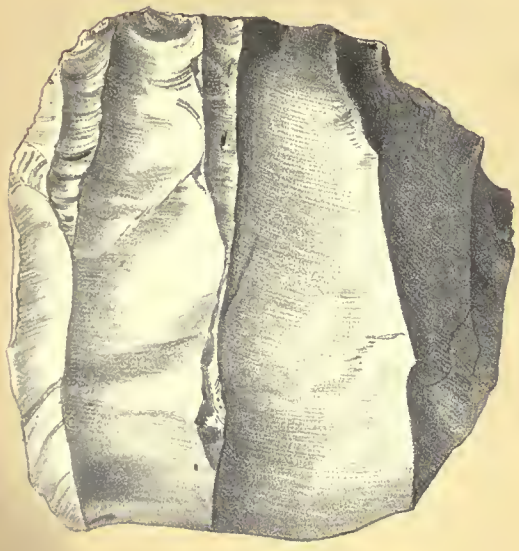

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Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE XIV.

The blocks of Flint here shown are nuclei or cores, from which flakes have been struck. Some such cores have been figured in A. Plate I.

Fig. 1. A roughly cylindrical and slightly tapering core, of brownish-grey flint (granular with minute fragmentary fossils). It shows upwards of twelve facets. [The end on which the blows were struck is placed downwards in the figure].
From Laugerie Basse.

Figs. 2 *a*, 2 *b*. A piece of black-grey flint (full of minute fossils), retaining on two sides some of its original surface, roughly splintered along one edge, and elsewhere bearing three well-marked facets. [Figured upside down.]
From Les Eyzies.

Fig. 3. A rough piece of dark-grey, granular, fossiliferous flint, retaining parts of two old surfaces (one consisting of the original crust, somewhat water-worn, and the other formed by the face of a subsequent fracture, water-worn and very smooth); whilst two sets of intentional fractures have produced, first, seven or eight facets (seen in the figure), and, secondly, a rude splintery surface, truncating the facetted face, at the top of the figure. The different degrees of glaze on the parts successively broken, as well as the interference of the fractures with the former faces, are easily recognized in the specimen.
From Laugerie Haute.

Fig. 4. A rough core of the greyish-brown, granular, fossiliferous flint so common as the material of cores and flakes in the Stations of the Dordogne. It shows six or seven facets on the side figured; whilst the other is nearly all covered by the original yellowish-grey crust of the flint-nodule.
From Laugerie Haute.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	106	4·173	68	2·677	52	2·047
2.	95	3·740	45	1·772	35	1·378
3.	70	2·756	70	2·756	50	1·969
4.	118	4·646	82	3·228	65	2·559

B. BONE IMPLEMENTS, &c.

B. PLATES VII. & VIII. (One Plate.)

A double-sized Plate is necessary for the full and convenient representation of some of the specimens now before us.

Fig. 1. A broken piece of a metatarsal bone of a Reindeer, on which are represented two forms of animals walking one after the other. The old artist, cutting them in outline, neglected their more characteristic features. Thus the head of the one in advance is indefinite in form, and has neither an eye, nor ear, nor indication of a mouth. Nevertheless the four oblique marks thrown in above the shoulders to indicate a mane, the curved line of the back and rump, the setting on of the tail, and the bend of the hock are sufficient to assure us that a Horse was here meant to be figured; and although the legs remain unfinished below, there is still in the general attitude of the animal an expression of movement, which denotes a practised hand and a capability of executing more correct work.

The hinder figure, still less carefully engraved, may nevertheless be recognized as having been intended for a Horse.

From La Madelaine.

Fig. 2. A fragment of some cylindrical implement made of Reindeer-horn, broken at the ends, but bearing a series of three animals walking one after the other; the middle one only is complete, and is a mere outline of a form referable to a Carnivore—perhaps a Fox. The figures of Carnivorous Animals are very rare at the Stations in Périgord; and on this account we have particularly brought forward this little specimen, though offering insufficient material for correct conclusions.

From La Madelaine.

Fig. 3. Here we have a subject that is better represented in B. Pl. II. fig. 7—namely, two Reindeer at a gallop, which are very well characterized by the bearing of the head and by the stretching of the faintly indicated limbs. This carving, much damaged by the decay of the material, is cut on the stem of a

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

Louveau del. et lith.

Imp. Becquet à Paris.

Reindeer's antler, the base of which had been pierced with a hole, of which half remains at the broken end of the specimen.

From La Madelaine.

Fig. 4. A piece of the cave-breccia from Les Eyzies, in which is imbedded a fragment of a long bone, retaining some traces of carving. At one end of it we see a part of the head, the neck, and the upper half of the trunk of an animal with a rather rounded back, bristling with long hairs, such as are also indicated by numerous hatchings on the part of the body that is preserved. The head is decidedly convex in front, and much raised towards the occiput, where, however, no signs of horns appear, nor of other appendages. The generic determination, therefore, of this animal is very uncertain. Nevertheless behind this animal, at a certain distance and near the other and broken end of the fragment, there is the front part of another head, of analogous form, and on this we see very distinctly some appendages having the appearance of horns rather than ears. This feature, together with the convexity of the forehead and the position of the much dilated eye in each of the heads, allows us to suppose that the designer of these two outlines had the intention to represent some Bovine animal.

This specimen was found in the cave at Les Eyzies by Messrs. Franks and Jones, during the excursion through Périgord in March 1864, in company with Messrs. Evans, Hamilton, Lubbock, and Galton, guided by our much regretted friend Mr. Henry Christy.

Fig. 5. The short tapering piece of Reindeer-horn here figured shows an abruptly broken carving, which, however, is not so indefinite as the last, but evidently represents the head of a Horse, the head of which is put back in a nearly vertical position, exaggerating the curve of shortened shoulders. The head is tolerably well set on; also the ear. The eye scarcely appears. The mane, as usual, is indicated by a line along the curve of the neck.

From La Madelaine.

Figs. 6 *a*, 6 *b*, 6 *c*. Fig. 6 *a* is a portion of a carved beam of a large Reindeer Antler. It bears at one end (*) the trace of a hole, almost obliterated by the fracture. The other extremity is also broken; but a sloping sawn surface at ** indicates that it probably ended in a wedge-like or tapering point. This specimen, of which only one side is here figured, is nearly cylindrical, and is covered all round by the carved outlines of four animals. As these could not

be reproduced in their entirety by figuring them on the convexity of the specimen, they are shown, in plan, in figs. 6 *b* and 6 *c*.

In fig. 6 *b* we have the drawing of the two animals for the most part visible in fig. 6 *a*; and the head and frontal appendages leave no doubt of their belonging to the genus *Cervus*. The head of the one in front is more conical than that of the Reindeer, and more like that of the common Stag (*Cervus elaphus*). In the horns, also, the brow-antlers and sur-antlers are near together as in the adult Stag; and the palmated or broad brow-antler of the Reindeer is wanting. The upper part of the stem is, it is true, turned too much horizontally backwards; but we must recollect that the designer could not do otherwise, having to avoid carrying the uppermost antlers on to the other face of the carved stem, already occupied by two figures of Horses; thus the horns lie too close on the shoulders for a Stag. We must also remark that the figure bears no trace of the tuft of hairs rarely absent under the neck of the Reindeer.

The second animal, or that behind the one already described, also has the physiognomy of the Stag rather than that of the Reindeer. Only in this case the form and direction of the horns are altogether abnormal, no doubt on account of the difficulty the carver had in placing them in the space at his command.

In fig. 6 *c*, are the two Horses which are carved on the side of the horn opposite to that shown in fig. 6 *a*. The front figure, to the right, is incorrect in several points of drawing; the head is badly set on, the eye is confused with the mane, and the legs altogether badly drawn.

The *pose*, however, of the second Horse is much better, and the general form is more correctly given; the limbs are more natural and better proportioned. Why, however, the old artist roughened the hair near the root of the tail (an unusual feature in the figures of Horses drawn by the Aborigines of Périgord), it is difficult to say, except that undressed horses and wild ponies often have rough tails, in consequence of rubbing them against rocks and trees.

From La Madelaine.

Fig. 7. A fragment of Reindeer Horn on which is carved a head, with a large and outstanding eye and a face apparently ending in a muzzle. Possibly some Bovine animal was intended to be figured. These features are repeated on the two sides of the specimen symmetrically; or rather one side of the face (with one nostril, one eye, and possibly one ear) is cut on one side of the stem, and the corresponding half on the other,—the two halves coming closely together

along the upper edge, and forming something like a full face*. Beyond the nose three pairs of oblique symmetrical notches are repeated at intervals along the same edge. There is also a crenature or notching on the other edge; and the broken end, behind the head, shows (Fig. 16 *b*) part of the circumference of a hole with which the horn† was pierced.

On the side opposite to that figured in the Plate, there is more of the jowl, and what seems to be part of the ear, as we may see by the annexed woodcut (fig. 16 *b*).

From La Madelaine.

Fig. 16 *a*.

The specimen lithographed in B. Pl. VII. & VIII. fig. 7, seen from above.

Fig. 16 *b*.

The same specimen showing the side not figured in B. Pl. VII. & VIII.

Fig. 8. A piece of Deer's horn, tapering like a wedge at one end, perhaps for insertion in the cleft of a shaft. The other end is broken, but seems to have been pointed, like other specimens. It may have been either a weapon or an implement.

On each side is the same kind of figure. The one shown in fig. 8 leaves much to be desired if it was intended to represent a Horse, of which, however, there is little doubt. In front of the head are several unequal notches, the signification of which it is difficult to suggest.

From La Madelaine.

Figs. 9 *a*, 9 *b*. A fragment of Reindeer Horn, broken at the ends. The carving on it is too indefinite for us to attempt a description. Fig. 9 *a* is a side view, showing the faint outline of a head something like that of a Boar, but for which we offer no interpretation. Fig. 9 *b* is an edge view, in which some have thought they saw the figure of an infant in swaddling clothes or basket!

* The intention of the old carver was evidently to make a front face out of the two side faces. Such attempts at making perfect figures, by the completion of two halves, and leaving as little as possible to the imagination, may be sometimes seen in old carvings in churches.

† This and the above-described specimen (fig. 3) were doubtless of the same character and use as those shown in B. Pl. III. & IV. Owing to information courteously communicated by Mr. A. C. Anderson, of Vancouver, and Mr. R. Brown, of Edinburgh, and of which we shall largely avail ourselves, we learn that antlers, trimmed and fashioned for use, are common enough among the Indians of North-west America as implements of various kinds, and used formerly to serve as a kind of club.

B. PLATES IX. & X.

The greater number of the Bone Implements illustrated by these two Plates may be regarded as armatures, or pointed heads, of implements and weapons used in Fishing and Hunting, or even in War. We will term them "Dart-heads," provisionally and for want of more certain definition of their character and use. Most of them have lost the pointed end, by accidental fracture; and in this state, the wedge-like or bevelled end remaining as a chief feature, they have some resemblance to such chisels as sculptors and stone-masons use; hence it has happened that, in descriptive works, truncated specimens like fig. 5, Pl. IX., have passed under the name of "chisels." In those implements, however, which have been preserved entire, as fig. 2, Pl. IX., and fig. 4, Pl. X., we see that one end tapers more or less rapidly to a sharp point; whilst the other extremity is cut down with two opposite oblique or bevelled faces, equal or not, but meeting at the end in a wedge-like shape. Thus fashioned, this extremity, broad and thin, is adapted for insertion in the cloven end of a handle or shaft of wood, in which it was then most probably securely tied by an outside ligature. To ensure the fixing of the armature in the shaft, and to prevent its slipping from the cleft, several cross cuts or grooves were made on both the sloping faces on those specimens which have the bevel shown, such as figs. 2 & 5, Pl. IX., and fig. 4, Pl. X.

It is impossible to decide that the larger of these Darts were thrown by hand, or that the smaller specimens were for Arrows to be shot from a bow. Neither the form nor size of any of the supposed shafts, probably of wood, are at all known to us; for no wooden implement, weapon, or other utensil has been preserved at our Stations in the Dordogne.

We here figure (Fig. 17) a modern specimen offering a very close analogy to our ancient Dart-heads of Périgord, especially in the mode of its insertion in its shaft. In this cylindrical armature, which is of very solid bone, one end tapers finely to a point; and the other or thicker end is bevelled on both sides, to be inserted in the split upper end of the shaft; and in this it was tightly tied and bound. This

Fig. 17. The bone Point or Head of an Arrow, from Oriental Siberia, or from Kamschatka. Reduced to five-sixths of the original, which is 9 inches long.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. IX.

Louveau del. et lith.

Imp. Becquet à Paris.

RELIQUIÆ AQUITANICÆ.

(*DORDOGNE.*)

B. PL. X.

Louveau del. et lith.

Imp. Becquet à Paris.

shaft is made of light wood, rather slender, $18\frac{3}{4}$ inches long, and feathered at the butt like an ordinary arrow. This specimen was given to us as having been brought from Oriental Siberia.

These Dart-heads, perfect in some instances, but mostly broken, and nearly all made of Reindeer Horn, occur in considerable quantities in some of our Dordogne Stations; and similar forms have been met with in like quantities in other caves of the same age, in other parts of France, as well as in deposits referable to a later epoch. In the caverns and rock-shelters of Périgord, however, it is not unusual to meet with specimens of this kind bearing outlines, and sometimes raised figures, of animals, of flowers, of arabesque ornaments, and of other designs, the meaning of which escapes us, or which were merely fanciful and aimless carvings. It is presumable that the many specimens elaborately and sometimes tastefully carved were objects of show, rather than implements for actual and daily use. The figures of animals and other ornaments are rarely single, but are ordinarily repeated on both sides of the stem and in series of the same kind. The Horse, indeed, is so frequently thus represented at our Dordogne Stations, as almost to lead one to suppose that the figure of this animal had been adopted as a social or national emblem by the people of this region!

B. PLATE IX.

Figs. 1 *a* and 1 *b*. A fragment of a Dart-head, wanting the pointed extremity, and retaining a portion only of one of the sloping, cross-grooved, bevelled faces of the wedge-like end. On each of its two opposite sides is carved what appears to be a human forearm and hand, very badly executed, and presenting only four fingers. On the arm are cut some oblique notches, in zigzag or chevron, ill defined, and repeated not quite symmetrically, even in their number, on the two sides. It is difficult to say whether in this carving there were meant to be shown any marks of tattooing or of dress, or merely fanciful lines of ornament.

From La Madelaine.

Fig. 2. A perfect head or armature of a Dart, without ornament. It is rounded towards the point, but is flattened at the middle of the stem and towards the wedge-like end, which is bevelled and cross-grooved on both faces for insertion in the cloven top of the shaft. The large notch just below the point is the

result of an old accident; but the three oblique transverse grooves below, one after the other, have been intentionally made, probably for ornament, and possibly for holding a poisonous material.

From La Madelaine.

Fig. 3. A Dart-head, without its point. It bears an incised ornamental pattern, repeated on the two sides, consisting of a waved line, the alternate concavities of which are occupied by an elongate-ovate (or somewhat fish-like) outline, traversed by from four to seven short and obliquely transverse lines. Whether this figure had any meaning or not it is impossible to decide.

From La Madelaine.

Fig. 4. Another truncated Dart-head, the point having been broken off. Its ornament is varied and carefully executed. On the side shown in our Plate, we see, below the middle of the specimen, something like a fully opened Flower with nine petals. At the lower end, between the converging edges of the bevelled faces, the same Flower is repeated, but with fewer petals, and its margin seems to have been encroached on by the cutting away of these two terminal slopes. On the upper part of the stem, above the first-mentioned Flower, there is an animal form, resembling an outstretched skin of a Carnivore, with a narrow snout and a thick tail, such as that of a Fox, or some allied animal.

On the other side of this specimen are carved two Horse-heads placed back to back, and below these a fantastical figure, indefinite and resembling nothing among animals or plants.

From La Madelaine.

Fig. 5. Another Dart-head that has lost its point. Its bevelled faces are scored with fine transverse lines, of which nine appear in the figure. On the figured side, and continued also on the edges, is the carved outline of a single Horse, without any accompaniment,—a rare circumstance among these ornamented implements. [The untinted portions of fig. 5 represent what is carved on the edges of the specimen.] This Horse's head, very long and heavy, is badly designed; the ears are short and scarcely distinguishable, the mane is more vigorously expressed, and the tail projects horizontally. The outline, though far from being correct, is boldly drawn, and, it would seem, by a firm and practised hand.

From La Madelaine.

Fig. 6. Another pointless Dart-head. This is carved with a bar-like ornament in relief, which at its upper part has four small squarish or subcircular

hollows in successive widened portions of the "bar," perhaps representing holes in it, and three such cavities at its lower part. This ornament is repeated on the opposite side, with a difference in the number of the pits.

From La Madelaine.

Fig. 7. A smooth, tapering, pointed Dart-head, of Reindeer Horn, in good preservation, but probably not quite finished. The point has been perfectly rounded; the lower half is flattened; but the thick end is partly cut, without having been completely bevelled on its two sides.

From La Madelaine.

B. PLATE X.

Fig. 1. A broken Dart-head, the point wanting. The bevelled slopes are not transversely scored, but have some longitudinal stripes. On the two sides are repeated figures of two Horses, galloping. The head is too stiff, and is badly proportioned; but the eye, the ear, and the mane are better expressed, and the general attitude has reference to the gallop of the Horse.

From La Madelaine.

Fig. 2. Another incomplete Dart-head, with carving on one side only. On the left we see the figure of a Horse, very badly designed, and damaged by decay of the Reindeer Horn. Above it, or to the right, is another figure, damaged also by decay, indistinct, but presenting a forked tail.

From La Madelaine.

Fig. 3. Another truncated carved Dart-head. Its incised ornamental figures, of an oblong form, traversed by six short transverse grooves, are too indefinite for characterization.

From La Madelaine.

Fig. 4. A small, rounded, tapering Dart-head, simple and without ornament. It is rather compressed; and its point is nearly triangular. Its bevelled end is marked on each face with several transverse grooved lines.

From La Madelaine.

Fig. 5. A broken Dart-head, carved with a series of at least three Horses, possibly on the gallop, on each of its two sides. The figures are very badly expressed.

From La Madelaine.

Fig. 6. A broken Dart-head, the point wanting, and the bevelled faces of the other end smooth and without the usual scoring. Its stem is nearly triangular, and bears on each of its three faces signs formed of lines crossed like a long X, or a Saint Andrew's Cross, surmounted by a bar or transverse line. This sign occurs twice on each of these imperfect faces.

From La Madelaine.

Fig. 7. A fragment of a Dart-head, broken at the ends. On the two opposite sides is repeated, symmetrically, an ornamental pattern consisting of what appear to be pairs of heads of animals placed snout to snout.

From La Madelaine.

Fig. 8. A large subcylindrical implement, broken at one end, but narrowed off by bevelling at the other, like the "Dart-heads." It, however, is much thicker than the ordinary specimens, and is slightly curved. On it is a series of oval figures, placed end to end, with the alternate opposed ends longitudinally marked by two or three grooves.

From La Madelaine.

Fig. 9. Another piece of a Dart-head—the lower part only. It exhibits an elongated carved outline with an eye (?) near the broader end. If it be an animal form, represented without legs, feet, or fins, it can be compared only with a young Batrachian or Tadpole. Behind this figure, and on the other side also, there are angular and crossing lines, making different patterns, without any intelligible characters.

From La Madelaine.

RELIQUIÆ AQUITANICÆ

(DORDOGNE.)

A. PL. XV

Louveau del. et lith.

Imp. Becquet à Paris

A. STONE IMPLEMENTS.

A. PLATE XV.

The specimens here figured are flakes of Flint, bearing more or less of the usual "glaze" of age, which have mostly been dressed to a taper point at one end; and two have had the broad end carefully rounded (figs. 3 and 8). Figs. 2 and 4 appear to be *old* fragments of flake tools. All these specimens bear marks of having been used in scraping or cutting or both.

Fig. 1. An elongate-oval flake of mottled, grey, dull flint. Tapered by chipping at one end (the lowest in the figure). The edges show the marks of use throughout.
Les Eyzies.

Fig. 2. Part of a narrow arched flake of grey, dull flint, the end having been removed by an old fracture. Edges roughened by use.
Les Eyzies.

Fig. 3. A small pointed flake of grey-brown, subtranslucent flint, chipped towards the point on one side, and towards the but-end on the other, to produce symmetry of outline. The convex edge towards the point slightly worn, perhaps by use.
Laugerie Basse.

Fig. 4. Portion of a long narrow flake of particoloured flint (yellowish-brown and greenish-grey), somewhat jasper-like, but subtranslucent. Edges worn.
Laugerie Basse.

Fig. 5. A simple, knife-like, curved flake of light-brown translucent flint. The thick end has been narrowed by chipping. Edges roughened by use.
Laugerie Basse.

Fig. 6. A simple, knife-shaped flake of brown-grey, subtranslucent flint, slightly whitened on the edge by weathering. Edges chipped and jagged by rough use in scraping and cutting.
Le Moustier.

Fig. 7. A thick straight flake of granular flint, drab and mottled outside by weathering, but subtranslucent and brownish within. Edges roughened but slightly, except at the tapering end, where they are more markedly chipped, probably in producing the original point which is now broken.
Les Eyzies.

Fig. 8. A simple blade-like flake, slightly curved, of yellowish-brown or snuff-coloured flint, with one end chipped round, and the other once dressed probably to a taper point, but now broken. Edges somewhat worn throughout.
La Madelaine.

Fig. 9. A simple, narrow, strongly arched flake of brownish-grey translucent flint. Edges worn by use nearly throughout, but chiefly towards the narrow and flat end, which is artificially tapered.
La Madelaine.

Fig. 10. A simple flake, narrow and somewhat curved, of coarse dark-grey flint, roughly chipped to a tapering point at one end. Edges roughened by use.
Les Eyzies.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	96	3·780	19	0·748	6	0·236
2.	82	3·228	16	0·630	5	0·197
3.	60	2·362	11	0·433	4	0·157
4.	63	2·480	18	0·709	4	0·157
5.	94	3·701	17	0·669	6	0·236
6.	98	3·858	24	0·945	6	0·236
7.	106	4·173	20	0·787	8	0·315
8.	145	5·709	23	0·905	7	0·276
9.	122	4·803	18	0·709	6	0·236
10.	113	4·449	18	0·709	6	0·236

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XVI.

Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE XVI.

Of these Implements of Flint, weathered and glazed, some (figs. 2, 3, 4, 5, 6, 7, 10) are of the same type as the majority of those in the preceding Plate,—that is, flakes dressed to symmetry at one or both ends. Figs. 1, 9, 11, and 12 resemble some drawn in A. Plate VIII. (see p. 27), which have one end pointed as a "tang," for fixing in a handle, and the other end somewhat shaped by chipping. All, except figs. 8 and 13, which appear to be rough unused flakes, bear marks of use.

Fig. 1. A neat, narrow, stout, "tanged" flake of brownish-grey translucent flint; pointed at one end by lateral fractures perpendicular to the flake's face, and chipped round at the other. The edges are worn,—the straighter edge throughout and the other partially; and the rounded end has its edge somewhat smoothed.
Laugerie Basse.

Fig. 2. A simple thin flake, slightly curved, of yellowish-grey translucent flint. Both edges partly worn.
Laugerie Basse.

Fig. 3. A simple knife-like flake of dark olive-brown subtranslucent flint; showing bulb of percussion and concentric undulations on the flat side. Edges chipped and jagged by wear. The triangular notch is an accidental fracture.
Laugerie Basse.

Fig. 4. A simple, narrow, tapering, and slightly arched flake of mottled light-brown flint. Edges very little roughened.
Laugerie Basse.

Fig. 5. A neat, arched, narrow flake of dark-brown subtranslucent flint; the bulb-end trimmed to symmetry. Edges worn, especially towards the sharp oblique end (upwards in the figure).
Laugerie Basse.

Fig. 6. A thick irregular-shaped flake of dark honey-coloured translucent flint. The bulb-end is thinnest and broadest, and has been rounded, having been

dressed, like the neighbouring part of the straight side, by chipping. One edge also of the triangular point has been reduced by minute chipping. The edges show no sign of wear.

Laugerie Basse.

Fig. 7. A long, arched flake of grey and slightly mottled flint, opake, either from weathering or from fire. Half of one edge (upper left-hand side of the figure) has been removed by lateral fractures perpendicular to the faces of the flake. The remainder of this edge and the whole of the other are somewhat worn by use. One end has been lost by an old fracture.

Les Eyzies.

Fig. 8. A narrow, simple, arched flake of dark-grey subtranslucent flint, rough and triangular in section. Edges not distinctly worn.

Laugerie Basse.

Fig. 9. A "tanged" flake of dark-coloured dull flint, with bulb of percussion and concentric undulations on the flatter side. The pointed end thick, and shaped as a "tang" by sharp lateral fractures. One of the remaining flake-edges (on the left-hand side of the figure) distinctly worn by use; the other less so.

La Madelaine.

Fig. 10. A simple, narrow, arched flake of yellow-brown flint, somewhat mottled with dark grey towards one end (lowest in the figure), which has been broken by an old fracture. The other end has been tapered by chipping. The edges somewhat used.

Les Eyzies.

Fig. 11. A thick "tanged" flake of opake, grey flint, pointed at one end by sharp lateral converging fractures,—and possibly once pointed by chipping at the other, which is broken. Side edges chipped and worn.

Les Eyzies.

Fig. 12. An arched, narrow, "tanged" flake of brownish-grey, subtranslucent, spiculiferous flint; pointed at one end by converging lateral fractures, and somewhat reduced by chipping at the other, which has lost its point by an

old fracture. One edge (left-hand side of the figure) more especially roughened by use.

La Madelaine.

Fig. 13. A rough narrow flake of dull grey flint, triangular in section and retaining a piece of the original crust of the flint-nodule. Edges not worn.

Laugerie Basse.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	79	3·110	13	0·512	5	0·197
2.	82	3·228	16	0·630	5	0·197
3.	86	3·386	20	0·787	5	0·197
4.	89	3·504	13	0·512	6	0·236
5.	80	3·150	13	0·512	4	0·157
6.	82	3·228	10	0·393	6	0·236
7.	150	5·906	22	0·866	8	0·315
8.	82	3·228	10	0·393	6	0·236
9.	98	3·858	22	0·866	9	0·354
10.	106	4·173	15	0·591	5	0·197
11.	104	4·095	25	0·984	9	0·354
12.	105	4·134	18	0·709	6	0·236
13.	88	3·465	10	0·393	5	0·197

A. PLATE XVII.

Four cutting or chopping, hatchet-like Implements of Flint (with the usual "glaze") from the Cave of Le Moustier. Two are remarkable as being of the same type as many found in the old gravel of the Somme, also in England and elsewhere. A more ovate instrument of this kind has been already figured from Le Moustier in A. Pl. III. fig. 2. The other two somewhat approach in shape those from Le Moustier already figured in A. Plate V. (see p. 17), and, like them, could have been conveniently used when held in the hand. These and similar implements, common at Le Moustier, and very rare elsewhere in the Caves of Dordogne, are referred to in the memoir entitled "Cavernes du Périgord," by MM. E. Lartet and H. Christy, in the 'Revue Archéologique,' 1864, pp. 238 &c.

Fig. 1. An ovately triangular, sharp-pointed implement, of a compressed pear-shape, boldly chipped out of coarse, mottled, greyish-drab, granular, opake flint, with an undulated cutting edge all round. This closely resembles some of the so-called "hatchets" from Amiens and Abbeville.

Figs 2 *a*, 2 *b*. A subtriangular, sharp-pointed implement, chipped out of dark-grey flint, that retains some of the outer crust on one face. The but-end is blunt, so that the "hatchet" can stand on end, as is the case with many from St. Acheul. Fig. 2 *a* shows one of the faces; fig. 2 *b* is an edge-view.

Fig. 3. A broken flake of water-worn dark brown-grey flint, retaining some of its brown crust, neatly chipped on one margin into a sharp semicircular edge like that of an axe, and well adapted for splitting and cutting.

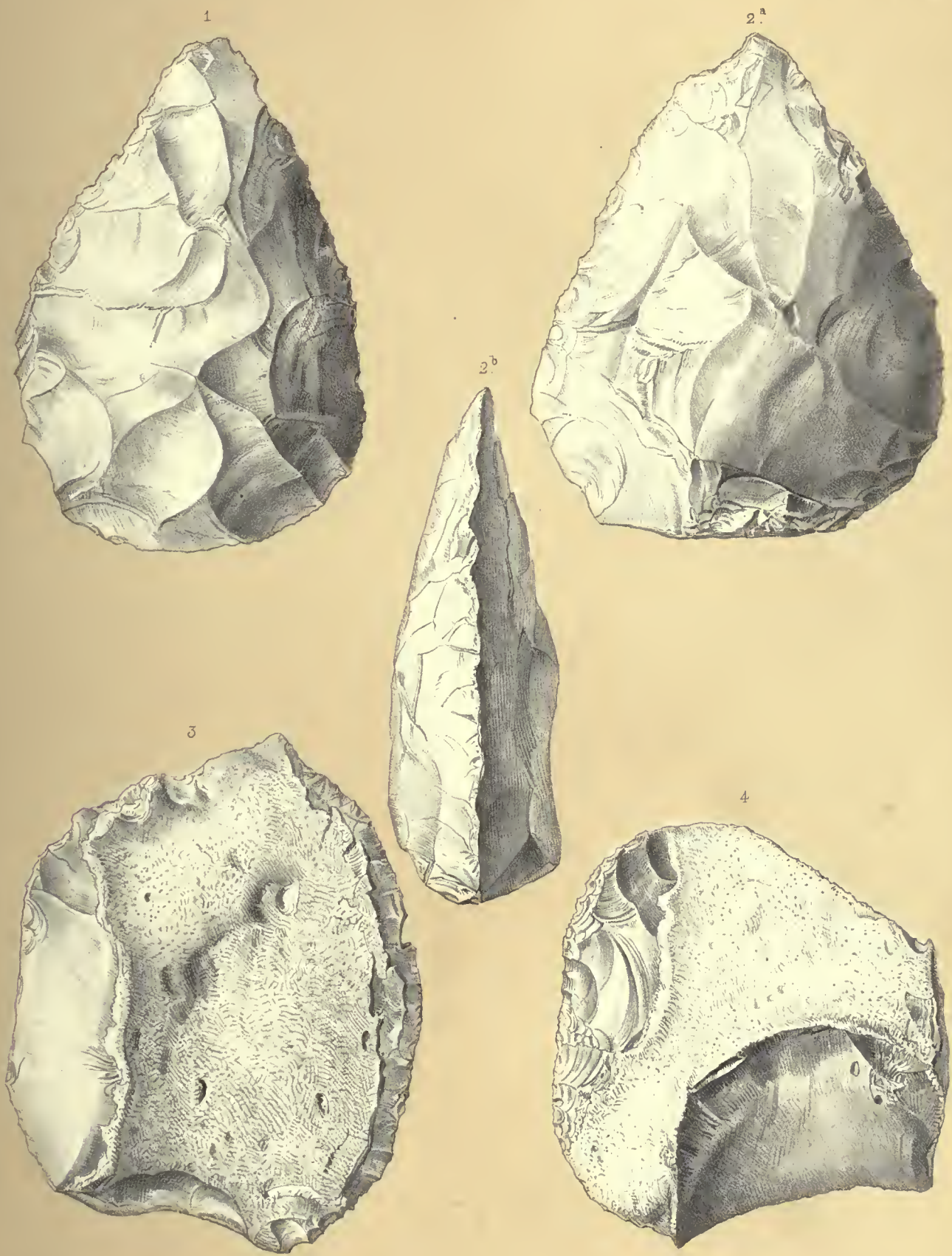
Fig. 4. A smaller axe-edged piece of a dark-coloured flint-flake, with a portion of its original crust. The cutting edge is not so semicircular as that of the preceding specimen, nor so neatly chipped.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	92	3·661	61	2·402	28	1·102
2.	92	3·661	75	2·953	31	1·220
3.	95	3·740	75	2·953	27	1·063
4.	75	2·953	72	2·835	25	0·984

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XVII.



Lou eau del et lith

Imp. Becquet a Paris

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XVIII.

Louveau del et lith.

Imp. Becquet à Paris

A. PLATE XVIII.

The Implements here figured have been worked out of Flint-flakes, and are more or less glazed and weathered. Figs. 2, 8, 10, and 11 are such Scrapers as we have already seen in A. Plate VI. &c. (pp. 18 and 21). Figs. 4, 7, and 9 appear to have been Scrapers fitted for shaping small cylindrical implements of bone or wood. Fig. 1 may also have been a two-edged Scraper; fig. 6 an Awl; and fig. 5, possibly unfinished, may have been intended to be either one or the other as circumstances required.

Fig. 1. A somewhat hook-like, flat implement of mottled, grey, granular flint, discoloured by weathering. The curved part has the shape of the share-bone or *coccyx* of a Fowl. The flake has been carefully reduced by chipping to a solid edge all round; and this is throughout splintered by crush, excepting on the outside of the curved point. What appears at first sight as a but-end may possibly have been a broad rough drill or a two-edged scraper.
Les Eyzies.

Fig. 2. A tanged implement of dark-coloured flint, having one shoulder formed by the wear and tear of rough scraping; and the opposite edge is partly splintered and partly worn.
Laugerie Basse.

Fig. 3. A tanged, broad, blade-like implement of honey-coloured translucent flint. One edge has been dressed straight, and the end oblique by chipping; and these, as well as the other edge, appear to have been used.
Laugerie Basse.

Fig. 4. A dressed piece of dark-grey flint, somewhat like an arrow-head with an oblique but-end set on to it, a notch on either side defining the sagittate portion. This latter has been trimmed to a solid edge on one side and a thin edge on the other, according to the relative thickness of the flake; its point is perfect and bears no sign of wear. Minute chippings, like those produced by scraping, mark the edges of the oblong part of the implement, and the blunt end is splintered. The notches are rounded, and have probably been used in scraping cylindrical rods, arrow-stems, skewers, pins, &c.; or possibly they

were made for ornament, or to help in tying the tool to the handle in which the sharp unworn end may have been fixed.

Les Eyzies.

Fig. 5. A dressed piece of a flat flake of yellowish-grey opake flint, straight on one margin and elliptically curved on the other; it has a sharp beak-like point at one end, whilst the other is thick and blunt, retaining the natural crust of the flint. There is no distinct evidence of wear on the point or edges; and possibly it was intended to have the point worked out as in fig. 6, or the thick end reduced as in fig. 1.

Les Eyzies.

Fig. 6. A dressed piece of a flake of yellowish, opake, granular flint, retaining some of the original crust*. The margin has been chipped into shape, and one end of the implement has been worked into an oblique point, about one-fifth the length of the specimen, which would serve as a rough awl or drill.

Les Eyzies.

Fig. 7. A dressed piece of a flat flake of mottled, grey, granular flint (with Polyzoa, &c.). Straight on one edge, curved on the other, and terminating at one end in a sharp point, this piece is somewhat knife-like, and has been trimmed to a solid edge all round, except that two opposite rounded notches break the outline at what may seem at first sight to be the but. These notches appear to have been used in scraping cylindrical sticks and rods, and are probably the most important feature in the implement, the rest of it being merely the handle.

Les Eyzies.

Fig. 8. A mottled dark-grey flint-flake, "tanged" at one end, and worked quite narrow at the other, as a two-edged scraper, the mid-ridge only of the flake remaining. The side edges are somewhat roughened, perhaps by use also.

Les Eyzies.

* In this very interesting specimen of Cretaceous Flint the crust of the original flint-nodule is siliceous and oolitic, the granules merely touching each other at their peripheries. This crust passes into the flint proper by the presence of a larger proportion of infiltrated siliceous matter (probably chalcedony); and the flint itself is oolitic, like some of that of the Portland Oolite, and like the siliceous Silurian Limestone of Durness in North-west Scotland. All of these are good instances of silex being a pseudomorph after limestone.

Fig. 9. A piece of a narrow flake of light-grey opake flint; one end has been broken away, and the other has been worked into two irregularly rounded opposite notches, as in fig. 7. The edges also of the flake are roughened by wear and tear.

Les Eyzies.

Fig. 10. A dressed piece of narrow flint-flake, mottled dark-grey. One end has been sharpened by chipping for insertion into a handle, and the other has one edge worn away deeply by scraping, whilst distinct indications of use are visible on the other edge also. This is a perfect specimen (see also page 21, fig. 2); very many have been broken at or below the shoulder (see A. Plate VI., and page 18).

Les Eyzies.

Fig. 11. Like fig. 10, but more clumsy, broken at the lower point, and worn somewhat by hard scraping on the left as well as on the right side (of the figure). In the crushed splintery edge of the hollow on the right side some red material, possibly hæmatite, still remains.

Laugerie Basse.

Fig. 12. A broken flake of yellowish-grey opake flint. Most of the margin has been broken off by lateral fracture; and none of the edges have been worn by use.

Les Eyzies.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	67	2·638	24	0·945	8	0·315
2.	68	2·677	30	1·181	7	0·276
3.	135	5·315	32	1·260	7	0·276
4.	70	2·756	27	1·063	6	0·236
5.	85	3·346	32	1·260	5	0·197
6.	79	3·110	25	0·984	10	0·393
7.	81	3·189	26	1·024	6	0·236
8.	100	3·937	22	0·866	10	0·393
9.	70	2·756	17	0·669	5	0·197
10.	67	2·638	12	0·472	4	0·157
11.	66	2·598	19	0·748	8	0·315
12.	105	4·134	24	0·945	8	0·315

A. PLATES XIX. & XX.

The Flint Implements figured in these two Plates came from the different beds of hearth-stuff, and the uppermost calcareous débris, in the Cro-Magnon Cave, described at pages 66–68, the same forms being repeated in the successive layers, and occurring also in company with the Human Skeletons in the uppermost deposit of that Cave. They are all more or less glazed, and some are whitened, by weathering. The longest specimen (A. Plate XX. fig. 3) was the only one of the kind found here; but it cannot be regarded as distinctively peculiar, being merely a straight, simple flake, triangular in section. This specimen, according to the statement of the workmen who began the excavation of the Cave (p. 65), was picked up beside the Old Man's Skull; see fig. 41, p. 67.

The principal character of very many of these Flint Implements from Cro-Magnon is their having been fashioned by much chipping on the edges and ends. Their shapes are not very much diversified; and the predominating form is either that of the so called "Scraper," or it approaches that type. Simple flakes more or less dressed, including many like those shown in A. Plate VIII., are also very common.

The nature of the Flint itself is not different from that found in the other Stations, except that pieces with yellowish tints have been more frequently employed.

In the prevalence of Yellow Flint and of much chipped Scraper-like Implements the specimens from Cro-Magnon resemble those from the Gorge d'Enfer (p. 4, and 'Revue Archéologique,' 1864, p. 240), collections from the two places showing also a characteristic breadth, massiveness, and finish. Two of the larger, and four smaller Grattoirs or Scrapers, stout and mostly yellow in colour, from the Gorge d'Enfer, are figured in A. Plate X., and described at page 35.

Thick flint-flakes (both flat and ridged) trimmed all along the edges and at the ends are not rare at Laugerie Haute (p. 5, and 'Revue Archéologique,' 1864, pp. 254 &c.); but there they are not equal in size to the large Scrapers from the Gorge d'Enfer, and they are associated with numerous highly worked leaf-shaped Implements, mostly lance-heads, such as are figured in A. Plate IV., and none of which have been found at the Gorge d'Enfer or Cro-Magnon. At Laugerie, also, there are numerous yellow specimens, but they do not predominate.

At Laugerie Basse simple flakes, sometimes dressed at the ends, and usually of dark tints, appear to be the most common Implements.

RELIQUIÆ AQUITANICÆ.

(*DORDOGNE.*)

A. PL. XIX.

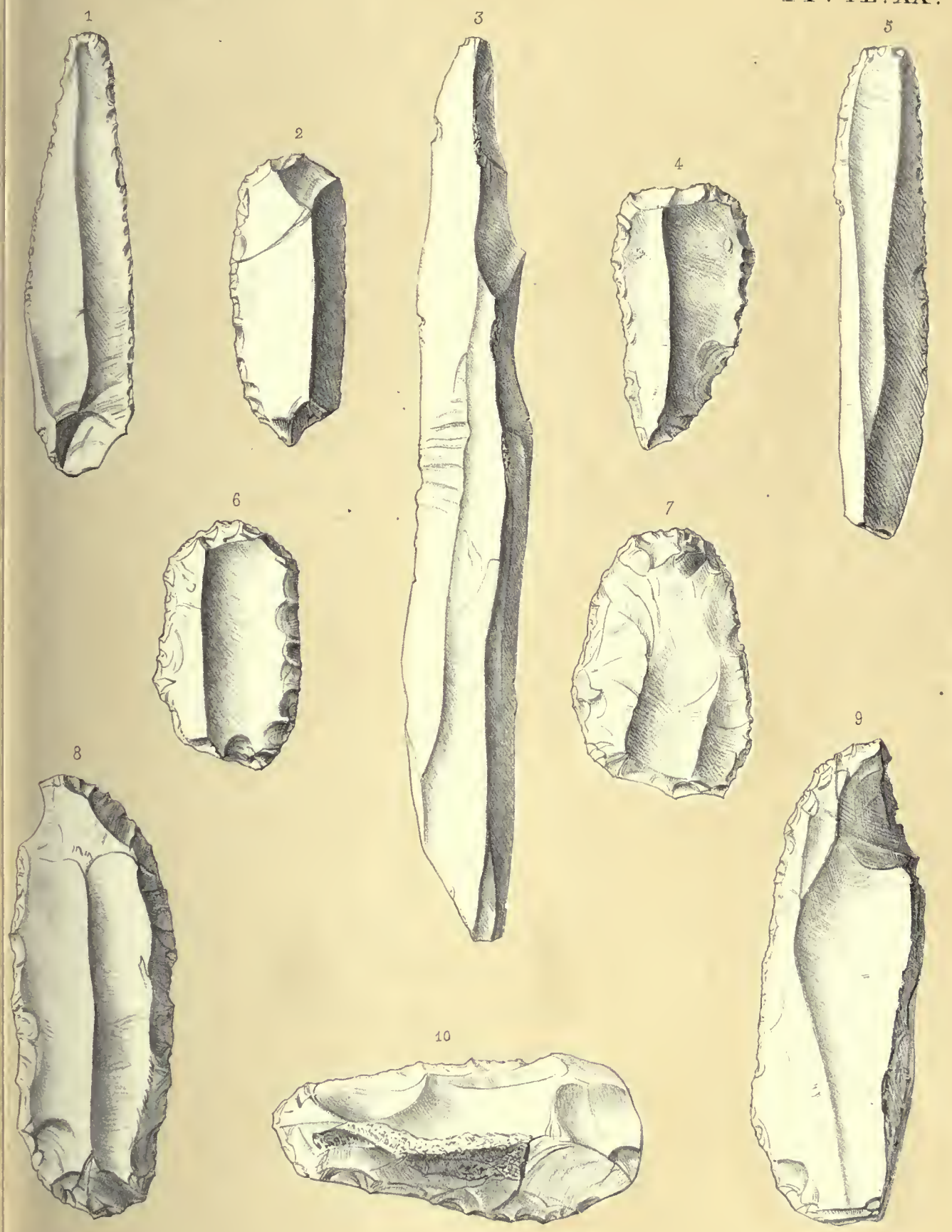
Louveau del. et lith.

Imp. Becquet à Paris.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XX.



Louveau del. et lith.

Imp. Becquet à Paris.

At Les Eyzies (p. 20, and 'Revue Archéologique,' 1864, pp. 241 &c.), where there are many yellow specimens, but where the dark-coloured and grey predominate, we find many thick and broad flakes, but none of those with worked edges are so broad as some from the Gorge d'Enfer. There is from Les Eyzies at least one broad flat yellow flake, but its worked end is chisel-shaped and not Scraper-edged. The associated implements, both large and small, from this Cave are characteristically different from those of the Gorge d'Enfer and of Cro-Magnon.

Simple long flakes, more or less trimmed, as well as common Scrapers, abound at La Madelaine (p. 5), where dark-coloured specimens prevail, together with small flakes and special shapes not found at the Gorge d'Enfer.

The Implements from Le Moustier (pp. 3 and 20, and 'Revue Archéologique,' 1864, p. 238), although comprising common Scrapers and chipped flakes, differ very markedly from those now under consideration.

Lastly, we recognize a kind of artistic taste in these neatly shaped Implements from the Gorge d'Enfer and Cro-Magnon; and we may remark that this is for the most part wanting in the Flint Tools and Weapons of other Stations, such as Les Eyzies and La Madelaine, where Art shows itself more advanced in another point of view, namely in carvings and in outlined figures.

A. PLATE XIX.

Eight neatly trimmed Flint Instruments and a fragment of another are here shown. Their uses are undetermined. Two at least are broad enough to have served as Spoon-like Implements, besides being Scrapers probably for dressing skins; perhaps they were useful both in scraping meat off bones and in ladling it up. Specimens like these have been found also at the Gorge d'Enfer. Fig. 1 may have been a lance-head—and is a rare type, both at Cro-Magnon and all the other Stations.

Fig. 1. A lanceolate, thick, sharp-pointed, slightly arched, and nearly symmetrical Implement, triangular in section. It has been formed, by rough chipping, out of a narrow, high-ridged, curved, cream-coloured flake, opake and flecked with grey, yellow, and red (possibly by having been partially burnt).

Fig. 2. A long, subovate Double Scraper, with trimmed sides (one of them rather less convex than the other), elliptical at the large end, nearly semicircular at the other. This has been chipped out of a large simple flake of subtranslucent

grey flint. In general make this may be compared with fig. 4 of A. Plate VIII. (p. 28), but its larger size, more oblong shape, and flat flake-face distinguish it.

Fig. 3. A long Scraper, made from a slightly arched, opake, cream-coloured flake. The broad end has been trimmed [it is much rounder than shown in the figure], and some portions of the adjoining edges, also the but (round the bulb of percussion). The sides have lost their original sharp edges, beyond the dressed portions, probably by use.

Fig. 4. The narrow portion of an Implement probably like that shown by fig. 5. It consists of yellowish opake granular flint. Part of the broad end of the specimen appears to have been used for scraping since it was fractured.

Fig. 5. A long, spatulate, nearly symmetrical, and slightly arched Scraper, tapering from its broad and obliquely rounded end to a narrow blunt but. This neat and spoon-like Implement has been carefully chipped out of a broad thin flake, dark-grey and somewhat mottled; and its sharp chipped edges bear the still finer crenulations and minute flakings caused by scraping.

Fig. 6. A small Scraper, made from a dark-coloured flake, and presenting signs of having been used.

Fig. 7. A large subspatulate Implement, somewhat triangular or harp-shaped. This has been chipped out of a broad, flat, and thin flake of opake, cream-coloured flint, mottled with purplish and reddish grey, and dotted in lines with obscure sections of small fossils. The long edges especially appear to have been used.

Fig. 8. A large Double Scraper, nearly oblong, made of a thick, high-ridged flake by bold chipping. It is yellowish white and opake externally; light-grey and subtranslucent in the interior, as shown by a recent fracture. The edges appear to have been used.

Fig. 9. A short, stout, slightly arched Scraper, chipped out of a flat flake, yellowish, but mottled with concentric chevrons of yellow and whitish bands. The elliptical outline of the underside of this Scraper is very neat in one part, but rugged elsewhere, and bears marks of wear. This may be compared with fig. 6 of A. Plate X., from the Gorge d'Enfer; and indeed it presents the commencement of the rough wear that appears to have produced the shape of fig. 5 in A. Plate IV.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	80	3·150	22	0·866	11	0·433
2.	87	3·425	32	1·260	12	0·472
3.	100	3·937	22	0·866	8	0·315
4.	60	2·362	21	0·827	6	0·236
5.	117	4·606	36	1·417	9	0·354
6.	60	2·362	20	0·787	7	0·276
7.	110	4·331	52	2·074	7	0·276
8.	100	3·937	41	1·614	15	0·591
9.	58	2·284	35	1·378	10	0·394

A. PLATE XX.

The Instruments figured in this Plate are of considerable interest. Fig. 3 may (from the conditions of its finding and its nature) have been the poignard, or personal weapon, of one of the Aborigines buried in the Cro-Magnon Cave.

Figs. 18 *a–c.*

Figs. 19 *a–c.*

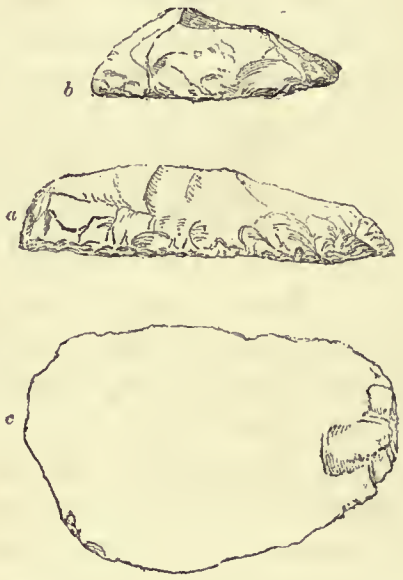


Fig. 5 is a rare chisel-pointed Implement. Figs. 2, 4, 6, and 7 have each had one end truncated, more or less obliquely, by use; in what operation, except

hard scraping, it is difficult to say; but there is also a similar but larger specimen from Cro-Magnon which is very much crushed, as if by hard blows, on the obliquely truncated end, and somewhat bruised on the round end. At first sight these implements seem adapted for *striking fire* with pyrites, or with such a stone as that represented by fig. 10 and the woodcuts, figs. 18 *a*, *b*, *c*; but, though scintillations of light are readily produced in striking one piece of flint against another, it is not easy to strike off sparks or incandescent particles fit to ignite any combustible material, except from some fresh, sharp-edged flints.

Whether or not these round-ended implements were used for any other purpose than scraping, the evident rough usage of one end in the specimens above mentioned strengthens the supposition, already offered at page 35, that the finish given to the ends, and to the sides also, had reference frequently to convenience of holding, and not necessarily to the formation of edges fit for handiwork, although in many cases the part that at one time was used as a handle may have been at other times used for scraping and cutting, and *vice versâ*, as convenience or necessity or whim may have prompted.

Fig. 1. A somewhat spatulate, or feather-shaped, and slightly arched Implement, made from a thin flake of cream-coloured granular flint, the tapering end having been chipped still narrower. We have one like this, but rather larger and dark-coloured, from La Madelaine.

Fig. 2. A Scraper of brownish-grey subtranslucent flint, with one end neatly rounded, the other angular [more neatly so than shown in the figure] by wear. One side has been chipped nearly parallel with the opposite natural edge of the flake, which has been somewhat used.

Fig. 3. A long, simple, high-ridged flake of chestnut-brown flint, variegated at the but-end with concentric elliptical bands of grey, enclosing a dark-grey portion and a nuclear spot of brown. It is also longitudinally marked with two or three faint, parallel, light-coloured lines. One end is narrowed by lateral fractures made on the block (core) before the flake was struck off. The extreme point of this Implement has been broken off; its edges are fresh and unused; it may have been mounted in a handle and used as a poignard. This interesting specimen was found at the same time with the Old Man's Skull; see page 70. Somewhat similar flakes, but arched, have occurred at Les Eyzies and La Madelaine.

Fig. 4. A roughish Scraper of dark-grey mottled flint; nearly straight across the

broad end (probably from use), and tapering obliquely to a blunt point at the other, one side being elliptically convex and the other nearly straight. Edges apparently worn.

Fig. 5. A simple flattish flake of light-brown spicular flint, the thin end of which has been somewhat squared and fashioned as a chisel by small chippings on the edges and both faces. The but-end is truncate, and narrowed by a lateral fracture. This is a rare type among the Flint Implements from Dordogne. We have one large stout flake from Les Eyzies, and one from the Gorge d'Enfer, showing such a point. We also have a short stout flake, trimmed and chisel-pointed, from the North of Ireland; and this has been crushed at the but-end, seemingly by blows.

Fig. 6. A short oblong Double Scraper of yellow granular flint, shading off into grey. One end is more neatly rounded than the other, and one side is straighter than the other,—irregularities probably due to wear and tear.

Fig. 7. A subovate tongue-shaped Double Scraper. See also woodcuts, figs. 19 *a*, *b*, *c*, p. 85. Piece of a flake worked all over the back with bold chippings, a part of the original flat face remaining as the under surface, the broad end of which is irregular in the curvature of its outline, probably from use. This specimen is partly brownish grey, and partly marked with concentric bands of brown and grey. The only two specimens represented in these two Plates that retain little or nothing of the original ridge-face of the flakes out of which they were made are figs. 7 and 10. We have, from Laugerie, a neat Double Scraper of light-grey flint, that has been worked all over the back with careful chipping.

Fig. 8. A drab-coloured, carefully chipped Implement, obliquely rounded at one end, beak-shaped at the other, and nearly straight on the sides, which appear to have been used. The notch has a fresher look than the rest of the surface; it has been produced by the removal of probably only one flake, leaving a thin, entire, curved edge, quite unworn. The original flint flake was flattish, but slightly curved, opake and fossiliferous (Orbitoides and Spicula).

Fig. 9. A mottled grey beaked Implement, somewhat like the last, but made out of a thick high-backed flake (triangular in section), the ridge of which (crushed and battered) is parallel with and close to the straight and thick side (unworn except at the ridge). This straight side (on which the specimen can stand on

edge) is continued backward into the neatly rounded outline of the scraper-like but-end [not well shown in the figure], and forward into the irregular notch, which has an old surface, and, like the curved side edge, seems to have been used. This beaked type of Scraper is found also at the Gorge d'Enfer. Figs. 8 and 9 have, in general shape, something in common with figs. 1, 5, 6, and 7 of A. Plate XVIII., described at pages 79 and 80, but differ from them in being Scrapers (that is, neatly rounded) at one end.

Fig. 10. A coarsely worked, lumpy fragment of a thick flake of dark-honey-coloured, spicular, and subtranslucent flint, retaining a portion of the original crust (opake, granular, and pinkish grey) on the highest part of the narrow convex back of the Implement. It resembles a great Slug, contracted and at rest. See also figs. 18 *a*, *b*, *c*, p. 85. One end is narrowed and arched, presenting, when held with the flat part upwards, a likeness to the prow of a boat; the other end is broader and more depressed, but flexuous and irregular in shape. The edge of one side has been roughly chipped into shape; but the other (lowest in the figure) has been further splintered and crushed, apparently by use (see also page 85).

Another such specimen, and two smaller and rougher, in dark grey flint, from Cro-Magnon, and a very roughly dressed specimen, from the Gorge d'Enfer, are the only analogues to this that we have met with from the Caves.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	84	3·307	21	0·827	5	0·197
2.	55	2·165	22	0·866	8	0·315
3.	170	6·693	21	0·827	9	0·354
4.	50	1·968	27	1·063	8	0·315
5.	93	3·661	17	0·669	8	0·315
6.	47	1·850	27	1·063	8	0·315
7.	51	2·008	34	1·339	12	0·472
8.	84	3·307	31	1·220	8	0·315
9.	92	3·661	30	1·181	15	0·591
10.	67	2·638	32	1·260	23	0·905

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

C. PL. I.

2

1

Louveau del. et lith.

Imp. Becquet à Paris.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

C. PL. II.

1

2

Louveau del. et lith.

Imp. Becquet à Paris.

Louveau del. et lith.

Imp. Becquet à Paris.

2

1

Louveau del. et lith.

Imp. Becquet à Paris.

2

1

Louveau del. et lith.

Imp. Becquet à Paris.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

C. PL. VI.

Louveau del. et lith.

Imp. Becquet à Paris

C. SKULLS AND BONES.

C. PLATES I.–VI.

Excepting figs. 2 and 3 (views of a Lower Jaw) in C. Plate III., which are represented of the natural size, all the figures in these Plates are drawn half-size.

[The artist has produced *reversed* figures on these Plates, not having used a mirror when drawing the specimens.]

C. Plate I.

Cranium No. 1: *Skull of an Old Man.*

Fig. 1. Side view.
Fig. 2. View of the face.

C. Plate II.

The same Skull.

Fig. 1. Seen from above.
Fig. 2. Seen from below.

C. Plate III.

Fig. 1. Occipital View of the same Skull.
Fig. 2. Lower Jaw of the Cranium No. 2 (Adult Male), seen in profile.
Fig. 3. The same, seen from above.
Figs. 4 and 5. Two of the thickest Ribs.

C. Plate IV.

The Cranium No. 2.

Fig. 1. Side view.
Fig. 2. Seen from above.

C. Plate V.

The Cranium No. 3: *The Skull of a Woman.*

Fig. 1. Seen in profile.
Fig. 2. Seen in front.

Table of Measurements of the Crania.

N.B. "Inial" (from ἰνίον, *occipitium*) in Cranioscopy has reference to the length of the skull taken from the central point of the Occiput, or Spina Occipitis Exterior.	No. 1.		No. 2.		No. 3.	
	French.	English.	French.	English.	French.	English.
I. The Calvarium.	millim.	inch.	millim.	inch.	millim.	inch.
Length, greatest	203	7·992	202	7·953	193	7·599
——, inial	200	7·874	...	....	185	7·284
Height	140	5·512				
Breadth, frontal, greatest	120	4·724	121	4·764	118	4·646
——, ——, smallest	105	4·134	102	4·016	100	3·937
——, temporal, greatest	140	5·512				
——, ——, smallest	135	5·315	136	5·354	123	4·843
——, parietal, greatest	152	6·011	153	6·024	140 ?	5·512
——, ——, smallest	145	5·709	157	6·181		
——, biauricular	116	4·567				
——, bimastoidean	132	5·197				
Radius, auriculo-frontal	126	4·961	....	....	120	4·724
——, auriculo-occipital	110	4·331	....	....	113	4·449
Circumference, horizontal (total)	580	22·835	580	22·835	540	21·260
——, antauricular	310	12·205				
——, postauricular	270	10·630				
——, vertical (total)	540	21·260				
(composed of the frontal	130	5·118	130	5·118	118	4·646
parietal	130	5·118	130	5·118	130	5·118
occipital	70+57	2·756+2·244	50+ ?	1·969	50+ ?	1·969
length of the foramen magnum	36	1·417				
length of the base of the skull	117	4·606)				
Breadth of the foramen magnum	26	1·024				
Biauricular curve	340	13·386				
Distance from the foramen magnum to the incisors	113	4·449				
Cephalic Indices.						
The length is to the breadth as 1000 is to	748	....	772	....	725 ?	
—— to the height as 1000 is to	690					
The horizontal circumference is to the vertical as 1000 is to	931					
II. The Face.						
Height, total	115	4·528				
——, nasal, great (including the nasal processes of the frontal)	57	2·244	....	....	52½	2·094
——, ——, small (from the fronto-nasal suture)	47	1·850	....	....	43	1·693
——, subnasal	58	2·283				
—— of the upper maxillary	63	2·480	....	....	60	2·362
Distance between the external orbital processes	120	4·724	113	4·449	112	4·410
Breadth of the orbits	41	1·614	36	1·417	35	1·378
Height of the orbits	27	1·063	....	....	27½	1·083
Breadth of the root of the nose	30	1·181	30	1·181	27	1·063
—— of the nostrils	27	1·063	....	....	23	0·945
Distance between the maxillo-malar sutures	130	5·118	....	....	89	3·504
—— between the malar prominences	135	5·315	....	....	112	4·410
—— between the zygomatic arches	142	5·591				

TABLE (*continued*).

	No. 1.		No. 2.		No. 3.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
Width of the palate	56	2·205				
Length of the palate	70	2·756				
The Lower Jaw.						
Distance between the posterior angles	113	4·449				
Length of the horizontal portion	103	4·055				
—— of the ramus	65	2·559				
Width of the ramus	49	1·929				
Height of the chin	32	1·260	31	1·220		
—— of the horizontal portion	30	1·181	25	0·984		
Thickness of the chin	15	0·591	12	0·472		
—— of the horizontal portion	18	0·709	12	0·472		

C. PLATE VI.

Long Bones of the Extremities. (Half the natural size.)

Fig. 1. Humerus.
Fig. 2. Femur.
Fig. 3. Tibia.
Fig. 4. Fibula.

TABLE OF THE MEASUREMENTS OF THREE HUMERI.

	No. 1.		No. 2.		No. 3.	
	French.	English.	French.	English.	French.	English.
	centim.	inch.	centim.	inch.	centim.	inch.
Length	34½	13·59	32	12·60	33	12·99
Breadth of the head	5	1·97	3·9	1·53	4·4	1·73
Circumference of the head	16	6·30	13·5	5·31	14	5·51
—— of the shaft above	9	3·54	9	3·54	10	3·93
—— —— below	10	3·93	10	3·93	10·2	4·02
Breadth of the articulation	62	24·41	57	22·44		

B. BONE IMPLEMENTS, &c.

B. PLATE XI.

(The figures are of the Natural Size, but, having been drawn on stone without a mirror, are *reversed* on the Plate.)

Fig. 1. A series of marine Shells, mostly *Littorina littorea**, that have been perforated and strung for use as Necklaces or other ornaments. The other Shells are *Purpura lapillus*, *Turritella communis* (*T. cornea*, according to M. Bourguignat), and *Fusus Islandicus*†.

About three hundred of these perforated Shells of *Littorina* were found in the Cave at Cro-Magnon. See pages 71 &c.

Figs. 2, 3, and 4. Small ovate flattish plates of Ivory, perforated at one end for suspension. See page 70.

In the specimen shown by fig. 4, we can see, at the fracture above the two holes, the structure peculiar to Elephant-Ivory, commencing to exfoliate. Other pieces of worked Ivory have been collected in the Cave; also perforated incisors of a great Ox (Aurochs?). Two of these teeth are in the possession of M. the Curé of Tayac.

The majority of the Littorina-shells figured in this Plate have preserved their colours, showing that they were taken alive and used whilst fresh. It is, of course, well known that this species is eaten at the present day on the Atlantic coasts of France and England. The five shells of other species on the same Plate, being quite discoloured and worn, were gathered, we must suppose, on the shore by those who used them. We may here remark that the old Cave-folk of Cro-Magnon seem to have used for ornament only shells of existing species, whilst those of La Madelaine and Laugerie Basse (see pages 43 and 48, and B. Plate V. figs. 15–20) got fossil shells from the Miocene Faluns of Touraine for the same purpose.

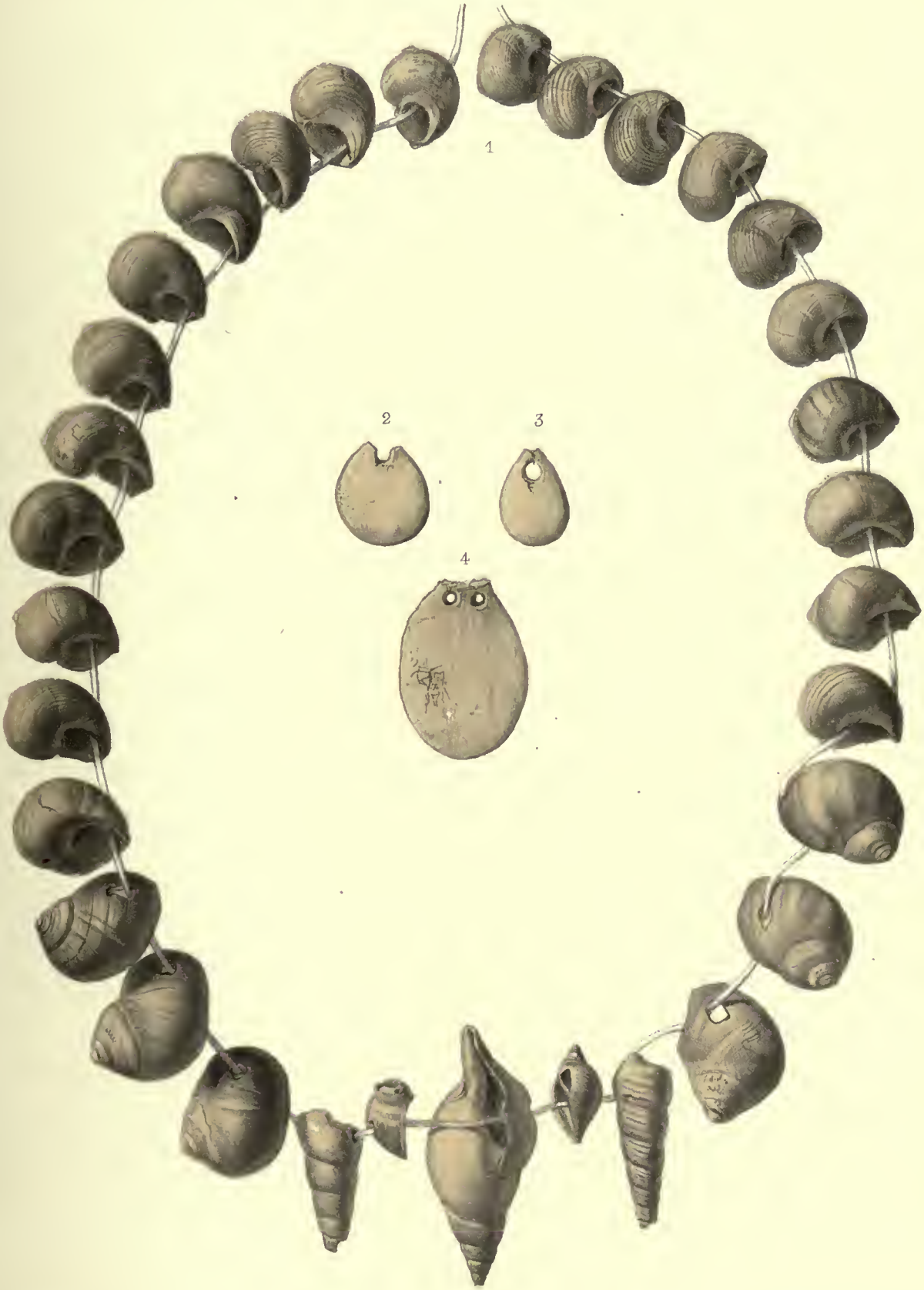
* According to M. Deshayes these Periwinkle-shells from Cro-Magnon have the aspect of existing varieties of the species now living in the North Sea.

† This Shell, which M. Bourguignat reminds us must not be confounded with *Fusus gracilis* (Da Costa), has been figured by our artist with its last whorl too convex and its spire too short.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XI.



Louveau del. et lith.

Imp. Becquet à Paris.

In arranging on B. Plate XI. this group of Shells in the form of a Necklace, we do not presume to decide that all were exclusively used in this manner; but we have been led to adopt this arrangement by analogous circumstances, certainly of more recent date, such as those observed in the tumulus in Phœnix Park, near Dublin, where a series of very similar shells (*Littorina littoralis*) was found "immediately under each skull," perforated (like those of Cro-Magnon), and still retaining some vegetable fibre which had served to string them together. In the 'Catalogue of the Museum of the Royal Irish Academy,' by W. R. Wilde, &c., 8vo, 1857, p. 183, a series of these shells are figured as part of a necklace, together with an urn and a double-headed bone pin found in the same tumulus (figs. 131–133). See also the 'Crania Britannica,' by Dr. J. B. Davis and Dr. J. Thurnam, vol. i. Decade iii. fig. 22.

Shells of *Littorina*, under the name of *Nerita littoralis*, are mentioned* by Dr. Buckland as having been found in the Paviland Cave (Goat's Hole), Glamorganshire; but, though not described by him as being perforated, one at least of these shells, preserved in the Museum at Oxford, has been pierced like those at Cro-Magnon†.

According to Dr. Buckland's account these Littorina-shells were associated with some remains of a human skeleton, which was regarded by him, we know not why‡, as that of a woman, and has since become famous as "the Red Lady of Paviland." Visiting the Oxford Museum, in 1863, accompanied by Dr. Falconer, and most courteously received by Prof. Phillips, we assured ourselves, by measurement of some of the long bones of this so-called "Red Lady," that they belonged to an individual of very great stature. Some of these bones are reddened with oxide of iron; and we saw that the remains of ivory implements are in the same state of alteration as the fragments of Elephants' tusks from which, as Dr. Buckland says, the implements had been made. These circumstances are strikingly analogous to what we observe in the Cave at Cro-Magnon, where also were found, besides Periwinkle-shells, the stump of an Elephant's tusk, with implements and ornaments made possibly from the ivory of the same

* 'Reliquiæ Diluvianæ,' 1823, page 88; in these words:—"close to that part of the thigh-bone where the pocket is usually worn, I found, laid together and surrounded also by ruddle, about two handfuls of small shells of the *Nerita littoralis*, in a state of complete decay, and falling to dust on the slightest pressure."

† With Professor Phillips's kind assistance, Mr. Rupert Jones was lately enabled to examine these specimens.

‡ Except, perhaps, because Periwinkle-shells and ivory beads are stated to have been found with a female skeleton in a tumulus.

tooth. Moreover, at Cro-Magnon among the human skeletons were found fragments of hæmatite or red ochre, unctuous to the touch, the contact of which, after the decomposition of the corpses, has left superficial red stains on a skull and femur referred to an old man (see page 74), just as we see on the bones of the so-called "Red Lady of Paviland." M. Oscar Fraas, in his description of the Station (of the Reindeer Age) of Schussenried*, near the Lake of Constance, has mentioned that very many bits of oxide of iron, once probably mixed with fat, were there found among the stone implements and remains of bones. The chemical examination of the unctuous ochre from Cro-Magnon has not proved the existence of any fatty ingredient.

Dr. Buckland, admitting that the ivory implements found in Paviland Cave must have been made out of the Elephant's tusk lying in the same cave, offered no explanation how this tusk had been preserved (if already fossil) so as to be made into implements after an interval of ages. Other observers have since then sought to explain the fact by attributing the preservation of the ivory to the same cause (extreme and continued cold) which still preserves in the frozen soil of Siberia the Mammoths' tusks that are every day dug out and sold to manufacturers. The present advanced study, however, of the Quaternary flora and fauna of Central Europe does not permit us to attribute to our climate in the Glacial Period the rigorous and perpetual frost that has preserved the fossil ivory of the Mammoth in Siberia.

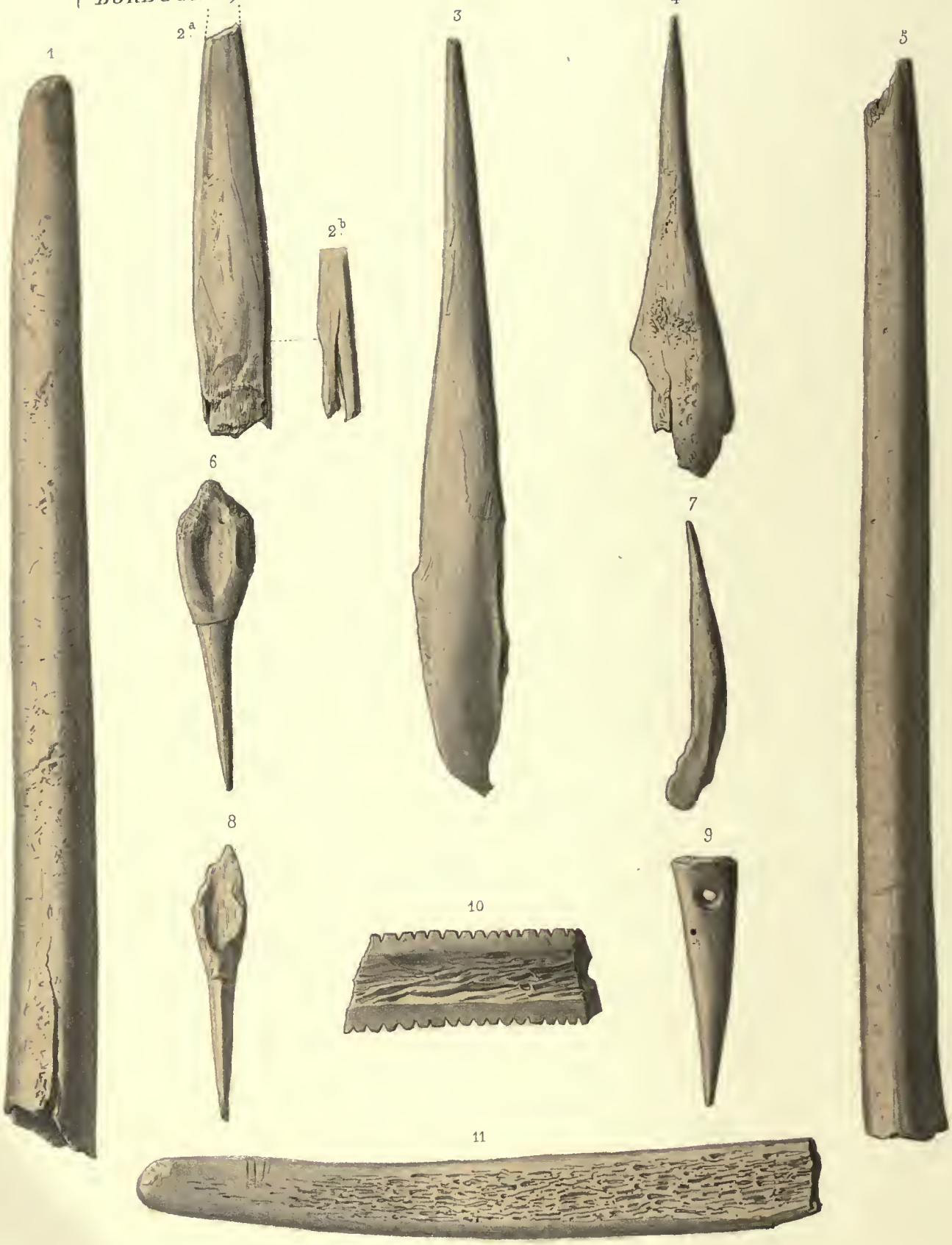
A much more simple explanation of the circumstance referred to above is met with by supposing the Mammoth to have been contemporary with the primitive inhabitants of Europe, who took for their purposes the ivory fresh from the Elephant.

* 'Staats-Anzeiger für Würtemberg,' Sept. and Oct. 1866; and 'Geological Magazine,' vol. iii. p. 546.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XII.



Louveau del. et lith.

Imp. Becquet à Paris.

B. PLATE XII.

This Plate, drawn, like the foregoing, without the use of a mirror, and therefore with the figures reversed, represents objects found in either the Sepulture or the layers of Hearth-stuff in the Cave of Cro-Magnon.

Fig. 1. A cylindrical piece of Reindeer Horn, artificially rounded and finished off at one end with a smooth point. We can say nothing as to its intended use, nor as to its original length, its lower part having been broken by an old fracture. This seems to have been found with the human skeletons, or at least in the uppermost layer in which the Burial had been made.

Fig. 2, *a*. An Arrow- or Harpoon-head of the lanceolate type, like those found in 1860 in the Sepulture at Aurignac*. It has lost its point by an old fracture. At its base, seen edgewise in fig. 2 *b*, we clearly see the slit in which we may suppose the bevelled end of the shaft to have been inserted†.

Besides the arrow-heads of this type found at Aurignac, we may refer to that found, by MM. les Abbés Bourgeois and Delaunay‡, in the Grotte de la Chaise (Charente). The late M. Poirrier de Montéombroux found one of similar shape in the Grotte des Fées, at Chatelperrou (Allier); and one of the Stations at the Gorge d'Enfer, on the right bank of the Vezère, opposite Les Eyzies, has furnished us with numerous specimens of these arrow-heads, with a more or less dilated base, and always tapering, without any trace of lateral barbs. Hitherto we have not met with this kind of arrow-head in any of the Stations that yields barbed arrows or harpoons, such as those figured in B. Plate XIV. We have also remarked that the lanceolate arrow-head is nearly always associated with a larger assemblage of extinct species of animals than that ordinarily accompanying the barbed kind of arrow-heads and other products of more advanced art and industry.

Fig. 3. A piece of a long bone of a Herbivore (perhaps a Horse), shaped into a perfectly rounded tapering point, like a great Bodkin, Skewer, Pin, Awl, or Javelin-point. The base shows no indication of a handle.

* Ann. Sc. Nat. 4me sér., Zoologie, vol. xv. pages 188 and 251, pl. 11. figs. 4 & 8 (1861).

† This is the reverse of the method adopted for the moveable Dart-heads figured in B. Plates IX. & X., page 68.

‡ Revue Archéologique, 1865: Notice sur la Grotte de la Chaise, par MM. Bourgeois et Delaunay, pl. 17. fig. 2.

Fig. 4. Another tapering and pointed Implement, but shorter and sharper; also made of a compact portion of a bone of a Herbivore.

Fig. 5. A cylindrical piece of Reindeer Antler, similar to fig. 1, except that it is broken at each end: this also was found in the uppermost deposit of the Cave, with the Skeletons.

Fig. 6. An Awl-like Implement, made of a bone of a Herbivore, with a large and broad but-end, convenient for holding in the hand when used.

Fig. 7. Another kind of Awl or Bodkin, with a flat one-sided but-end.

Fig. 8. A straight and slender Bodkin, Awl, or Arrow-point, with a broad and rough but.

It is probable that most of the Bodkin-like Implements were used for fastening garments—none of the Stations of this Age having yet yielded eyed needles, such as those found in the more recent Stations of La Madelaine, Laugerie Basse, Bruniquel (Tarne et Garonne), and Massat (Ariège).

Fig. 9. Another Awl or Bodkin, tapering and rounded, but thicker than the foregoing, and pierced near the but, where it is somewhat flattened, with a hole for suspension. This hole opens out on each side and narrows in the middle, showing that the boring must have been made alternately on one side and the other. The material is white and compact, but so altered in structure that we cannot say if it be ivory or deer's horn; it is not bone, properly so called.

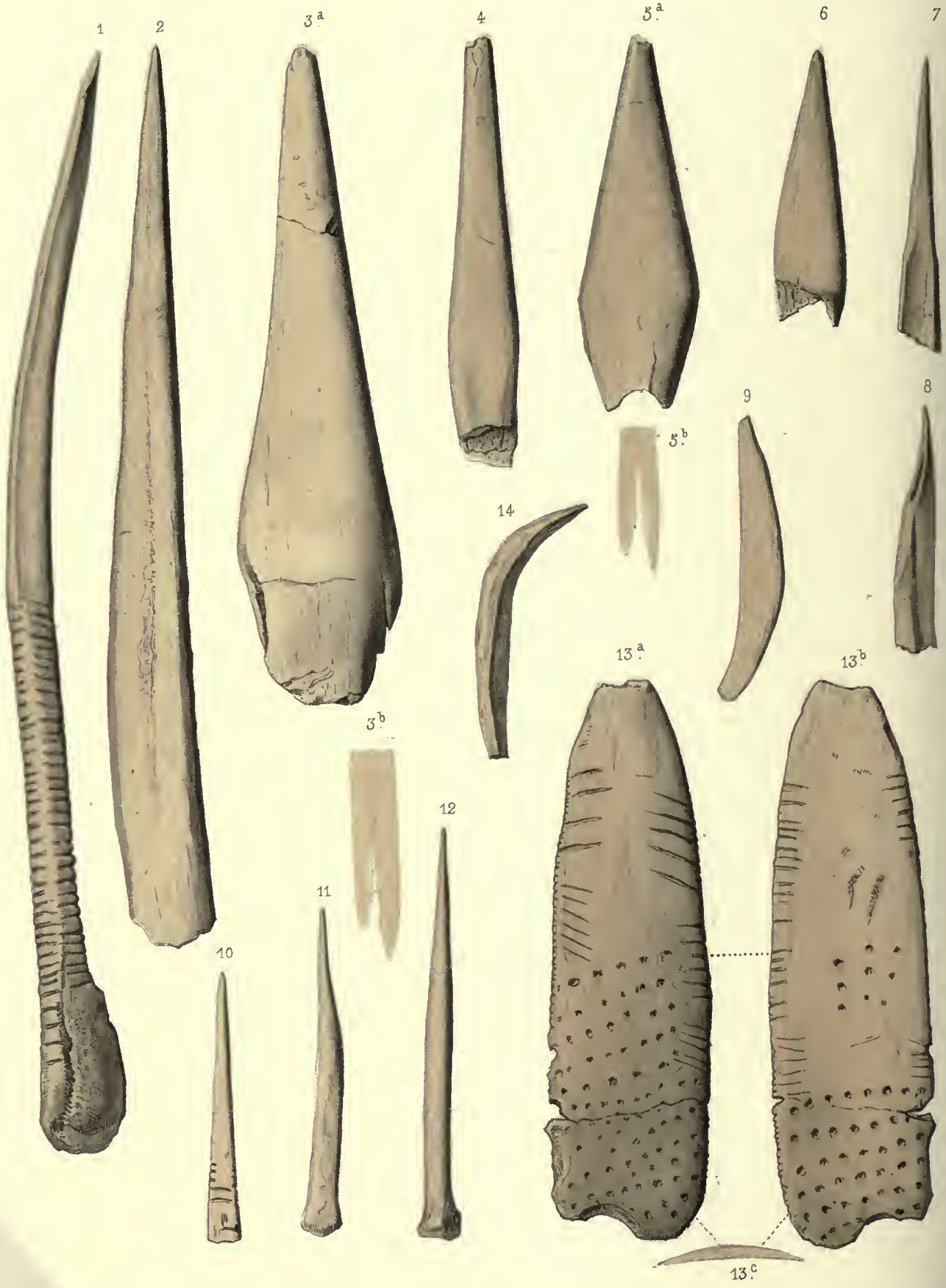
Fig. 10. A fragment of a thin, narrow, straight-edged plate of Reindeer Horn, showing on one side the cellular structure of the middle portion of the antler, and numerous notches along the edges. We have a similar specimen from the Gorge d'Enfer; and in the 'Annales des Sciences Naturelles,' vol. xv. (above cited), pages 189 and 251, pl. 11. fig. 7, another is figured, from Aurignac; this latter has transverse lines engraved on its convex and smooth face, besides notches on the margins. These have been regarded as hunter's marks; but no satisfactory explanation of the intention with which they were made has been arrived at.

Fig. 11. Another piece of Reindeer Horn, long, flat, and narrow, polished on one side. It is comparable with the Aurignac specimen, fig. 6 of plate 11, in the 'Ann. Sc. Nat.,' vol. xv., above cited. Other fragments of similar implements have been found at the Gorge d'Enfer, and are such as are regarded by the Danish Archæologists as having been used in dressing skins for clothing.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XIII.



Louveau del. et lith.

Imp. Becquet à Paris.

B. PLATE XIII.

All the specimens here shown came from a Station in the Gorge d'Enfer, on the right bank of the Vezère, and nearly opposite to the village of Les Eyzies. We have introduced this Plate immediately after those illustrating the contents of the Cave of Cro-Magnon on account of the close analogy existing between the fossil fauna and archæological remains found at the one and the other of these two Stations.

Fig. 1. An instrument of unusual shape; of its intended use it is impossible to speak decisively. It is a narrow, curved, blade-like tine of a Reindeer's antler, retaining a rough, unworked but-end, above which, and for more than a third of the whole length, the stem is subcylindrical, and bears four vertical rows of transverse notches or cut lines, unsymmetrical, and irregular in number. Where these end, the stem is somewhat polished and becomes triangular; but towards the extremity it is flattened, and had a somewhat chisel-like point, before it lost a portion of one edge by a recent fracture,—the cause of its appearing pointed in the figure.

[Specimens of bone closely resembling this one in shape (in the Christy Collection) have been brought from Western Australia, where the Natives wear them in the cartilaginous septum of the nose, which is perforated for the purpose. These bone spikes may serve as head-scratchers (like the pointed sticks worn in the hair by the Shohoes of Abyssinia), and for many other purposes.—T. R. J.]

Fig. 2. The head of a kind of Javelin or Arrow, long, and tapering from butt to point. Its base is transversely slit (as in figs. 3 and 5), to receive the wedge-like end of the shaft; as with other arrow-heads of the lanceolate (not barbed) type.

Figs. 3, 4, 5, and 6. Lanceolate moveable heads for Harpoons or Arrows, of different sizes; all made of Reindeer Antler. The base is in all more or less damaged, but retains traces of the slit to receive the shaft, as shown in figs. 3 *b* and 5 *b*.

Fig. 7. A very sharp, pointed Implement, made of very compact bone. Compare figs. 6 and 8 of B. Plate XII. [This is very similar to a specimen, from the Lake-dwelling of Meilen, figured in Keller's 'Lake-dwellings of Switzerland,'

&c., translated by J. E. Lee, 8vo, 1866, pl. 3. fig. 20. Similar pointed instruments of bone and horn necessarily have been, and still are, in common use as piercers, arrow-points, &c., especially among people not in possession of metals*.—T. R. J.]

Fig. 8. A pointed Implement, made of a hollow and very thin bone (probably of a Bird), by one end having been cut away obliquely.

Fig. 9. A flat, curved Implement, almost sharp-edged on its convex margin; made of Reindeer Horn.

Figs. 10, 11, and 12. Small pointed Implements made of the most compact portion of the tines or points of antlers of Reindeer or other Deer. That shown by fig. 12 is exactly like the specimen, from Aurignac, figured in the 'Ann. Sc. Nat.' *l. c.* pl. 11. fig. 2. In the absence of eyed needles, probably these served as awls or bodkins for sewing; fig. 10, however, has some cross cuts at its base, that may possibly have reference to its having been lashed on a stick as an arrow-point.

Figs. 13 *a* and 13 *b* represent a somewhat oblong flake, of compact bony substance, with a nearly flat face in fig. 13 *b*, and slightly convex in fig. 13 *a* (see the section, fig. 13 *c*). This specimen has been of necessity strongly impregnated with gelatine for its preservation; and it is difficult now to form a notion of its real structure, excepting that at certain points of fracture we believe we can see some traces of exfoliation; so we hesitate to come to a decision as to whether it is antler, hard bone, or ivory. It may possibly consist of the last-named substance, as far as its appearance proves—especially as a worked piece of Elephant's tusk was found with these specimens in the Rock-shelter at the Gorge d'Enfer, just as a fragment of a tusk was found in the cave at Cro-Magnon (see page 66).

Fig. 13 has a minute marginal notching, probably for ornament. The series of shallow cuts near the edges, and the somewhat systematically arranged pitting, on both faces, are very puzzling,—if indeed they were intended to mean anything at all. The reader will observe that the groups of cuts differ in direction, shape, and number; but in this some may see a character of value. It is difficult also to say if the combination of oblique transverse lines

[* Such pointed implements of bone have been found in the Mounds of North America, where also implements of metal occur; see 'Smithsonian Contributions,' vol. i. p. 220, figs. 119 & 120; and vol. ii. p. 79, figs. 25–27.—T. R. J.]

of pits was made on a premeditated plan. The several lines have not the same number of pits, nor is the arrangement of the latter vertically symmetrical. Though the isolated group of pits on the flat face (fig. 13*b*) gives *nine*, when counted either vertically or transversely, yet neither this nor the groups of notches constitute for certain any indication of a system of numeration,—nor indeed are we sure that they belong to any intelligible plan of marking.

Fig. 14 is a small, much curved, and sharply pointed Implement of Reindeer Horn, triangular in section where it is thickest and straightest.

B. PLATE XIV.

All the specimens figured in this Plate were got from the Station of La Madelaine in Dordogne. Similar implements have been found at other Stations in the same district,—that of Laugerie Basse, for example, and also in the Cave of Les Eyzies properly so called, not far from the Cro-Magnon Cave. (For similar Harpoons, see B. Plates I. & VI., pages 9, 49, &c.) The caves and rock-shelters of Bruniquel (Tarn et Garonne), of Massat (Ariège), and of Chaffaut (Vienne), have also furnished barbed Harpoons and Arrow-heads. Lastly, among the works of industry collected, during the last twenty years, at a Station (of the Reindeer Age) at the foot of Mont Salève, in Switzerland, there is a specimen belonging to this type; it is preserved in the Museum at Geneva.

We may here refer to what has already been stated (page 95), without, however, definitely limiting the use of these Harpoons to the old Fishermen, that remains of fish are found in the Stations with the barbed implements, and none occur with the lanceolate weapon-heads.

We have therefore produced this Plate of barbed Harpoon-heads, in sequence to those of a different type, from Cro-Magnon and the Gorge d'Enfer, as offering a convenient contrast of the implements found in these Stations with those from La Madelaine, Laugerie Basse, and other places, where the contemporary Fauna comprises fewer extinct species of Mammals—a fact that justifies the chronological distinction hitherto adopted by Archæologists for these two phases of the Quaternary Period.

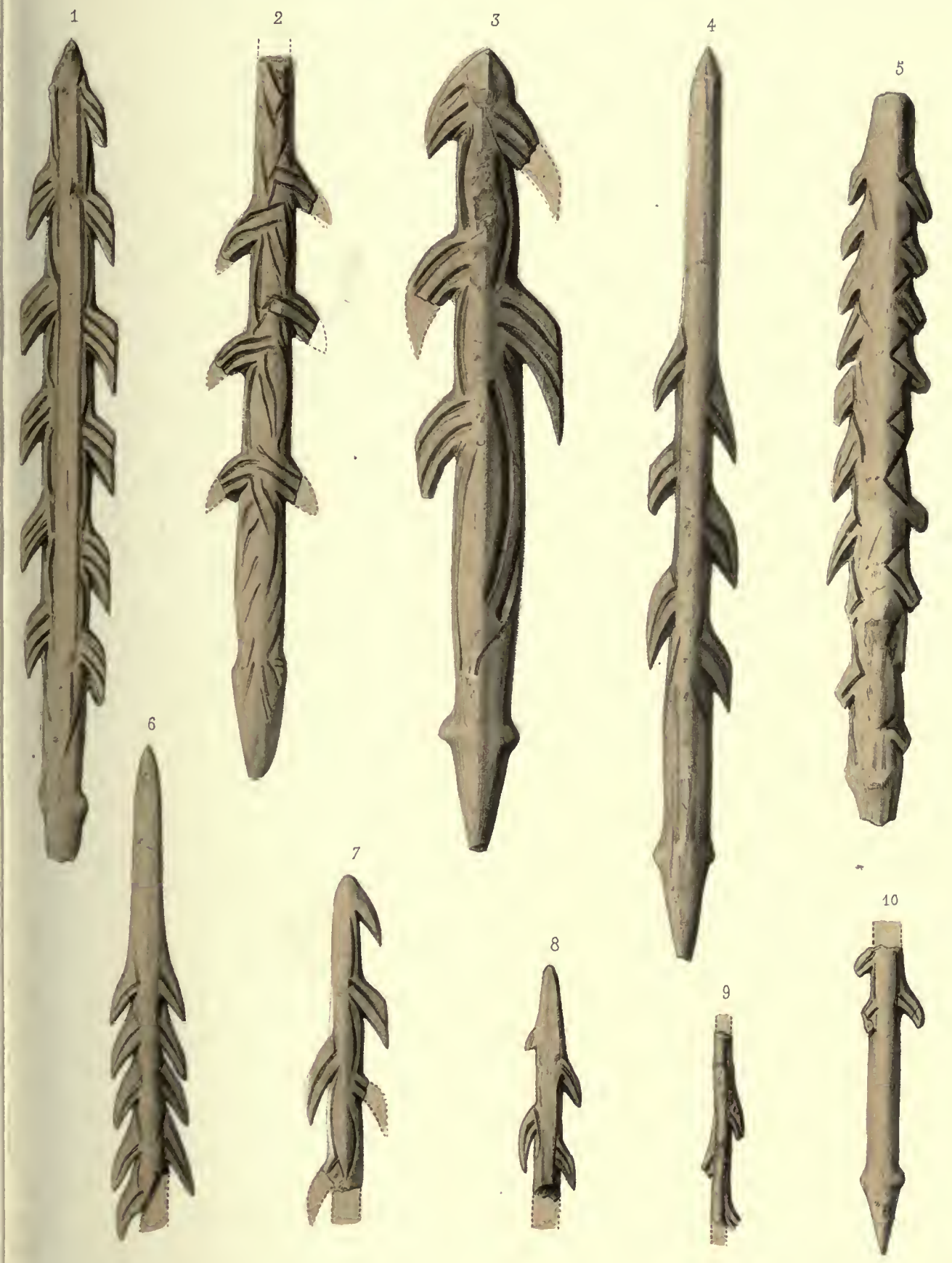
Fig. 1. A double-barbed Harpoon- or Arrow-head; bluntly pointed; armed with six recurved, double-grooved barbs on one side, and five on the other; and furnished with lateral knobs (or an imperfect fillet) just above the tapering butt, which was inserted in the top of the shaft. We see the same fashion adopted in many barbed Weapon-heads from Stations in Dordogne, such as those figured in B. Plates I. & VI., in some from Massat, figured in 'Ann. Sc. Nat.' ser. 4, vol. xv. pl. 13, figs. 3, 5, and 6, and in modern Esquimaux Implements (see pages 50 and 51).

This specimen is ornamented with short, curved, longitudinal grooves on its sides, from barb to barb. It has probably been longer and more tapering at the point, and seems to have been roughly repointed after fracture.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XIV.



Louveau del. et lith.

Imp. Becquet à Paris.

Fig. 2. Another Harpoon-head, with only three pairs of barbs, the lowest pair opposite, the other barbs alternate; they have been subconical, but are broken, as is also the long tapering point of the Implement. The barbs are deeply and doubly grooved; and the stem bears many flexuous and obliquely longitudinal grooves and notches.

Fig. 3. A large specimen of the same type as fig. 1, but evidently much shortened by ancient fracture and repointing. The grooved ornament is bold and deep, especially on the stem; and the tapering butt, with its knobs, is neatly shaped.

Fig. 4. This is a longer, more slender, and rarer form than the foregoing; it has its original long tapering end and suddenly sharp point, and only three pairs of alternating, single-grooved barbs. Some faint traces of oblique grooves remain on the stem.

Fig. 5. This specimen, broken at each end and deprived of some of its barbs, had on either side numerous, sharp, single-grooved, close-set, and strongly recurved barbs. The groove on each barb was joined at its base by an oblique groove, varying in length, from barb to barb, and thus altogether constituting an irregular zig-zag lateral line.

Fig. 6. The long, tapering, sharp point of a slender Harpoon-head, similar in type to fig. 4, but having its barbs far more numerous, close-set, and opposite.

Figs. 7–10. Other fragments of smaller barbed Weapon-heads, of the same type as fig. 4. Figs. 7 and 8 appear to have been repointed.

B. PLATE XV. & XVI. (One Plate.)

We have here before us other specimens of those Implements, of problematic use, of which we have already figured some, more or less imperfect, in B. Plates II., III. & IV., and VII. & VIII. We have seen that various suggestions have been offered as to the probable use of these trimmed and ornamented Antler-stems, —namely, as implements in common use, for splitting soft wood, stripping bark from trees, &c.*, and for killing game†; as arms, for fighting‡, and as insignia of rank or social distinction§, and possibly also employed in superstitious usages. We shall not, however, at present attempt to determine the relative value of these suggestions, which may be strengthened or enlarged by further information, and by the study of the very many specimens yielded by the Caves of Dordogne. It will be useful, however, to remark that Implements of this kind are not found indiscriminately in all the Stations (hitherto examined) of the Period of Chipped Stone where the Reindeer is more or less abundantly represented by its bones or by tools and other articles of use or art wrought out of its antlers. Thus as yet we do not know of any well-defined specimen of these peculiarly worked antlers in the more ancient Caves at our Stations, characterized by the presence of the *lanceolate* Dart-head (see B. Plates XII. & XIII.) and the older fauna (page 95). In support of this view we may also cite the Caves of Aurignac (Haute Garonne), La Chaise (Charente), Des Fées (Allier), and the Rock-shelter in the Gorge d'Enfer (Dordogne), mentioned above (pages 94 and 97), as not having yielded as yet any fragment of a worked antler analogous to those under notice; whilst the latter, on the other hand, show themselves more or less abundantly at all the Stations where *barbed* Harpoons were used, such as the Caves of Massat (Ariège) and Les Eyzies (Dordogne), the Rock-shelters of La Madelaine and Laugerie Basse (Dordogne), the Caves of Bruniquel (Tarn et Garonne), and of Le Chaffaut (Vienne), &c. We may also include in this latter category the Cave at Mont Salève (Haute Savoie), where M. Alphonse Favre‖ and M. Thiolly¶ have discovered similar

* Pages 38 and 59.

† Pages 50 and 52.

‡ Pages 40, 52, and 60; and page 67, *note*.

§ Page 41; and pages 30, 31, and 33.

‖ "Station de l'homme de l'âge de la pierre à Veihrier près de Genève," 'Archives des Sciences, Bibliothèque Universelle de Genève,' Mars 1868. See also Mortillet's 'Matériaux pour l'histoire de l'homme,' vol. iv. pp. 91 &c.

¶ "Epoque du Renne au pied du Mont Salève," 'Revue Savoisienne,' Mars 1868. See also Mortillet's 'Matériaux,' vol. iv. pp. 93, 152, 154, &c.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

Louveau del. et lith.

Imp. Becquet à Paris.

worked antlers, ornamented also with well-engraved figures of animals and plants; and moreover in the same Cave remains of eyed needles and barbed harpoons occur. Lastly, the Station of Schussenried, in Würtemberg, has also furnished two specimens* of the same kind of implements, consisting of antlers in the rough state and not ornamented, but pierced, like the others, one with two, and the other with a single hole, near the base.

It seems, then, that in the Chipped-Stone or Palæolithic Period there were distinct epochs, characterized by the palæontological aspect of the Fauna, by the progress of art and industry, and, lastly, by the introduction of new habits and customs.

Fig. 20.

Sketch of the edge of the carved and perforated Implement, fig. 1, B. Plate XV. & XVI., showing the transverse notches or scoring. (Reduced to two-thirds of the real size.)

Fig. 1. This was the shed antler of a young Reindeer, or perhaps of a doe, judging from the small size of the base. The stem or beam has been cut away laterally, so as to present two flat faces, the convex edge of which still bears the bases of three truncated branches at unequal distances. The stem appears to have lost some of its length by an old fracture. The convex edge is ornamented, or at least marked, with a scoring of numerous (thirty-three), slight, transverse notches—some at equal distances apart, some more widely separated, and a few in pairs (see Woodcut, fig. 20). The two broad and flat surfaces are grooved with two chief lines from base to top; and secondary groovings follow the contours of the projecting stumps. Four holes, of unequal diameters, are pierced in the wide portion, from the brow-antler to the third branch or "royal" above. Four is the greatest number of holes we have yet met with in these implements (see also B. Plate III. & IV. fig. 5).

From La Madelaine.

Fig. 2. This Reindeer Antler has still a portion of the

* These two specimens were exhibited in the Universal Exposition at Paris in 1867 (Mortillet's 'Matériaux,' vol. iii. p. 254). See also Mortillet's 'Matériaux,' vol. ii. p. 555, vol. iii. pp. 253 and 427, and vol. iv. p. 198, for notices of the excavations at Schussenried.

frontal bone adhering to it. Its brow-antler, somewhat distant from the burr, has been cut off. The stem bears a certain number of parallel longitudinal groovings, and is not perforated. A similar Implement is shown by fig. 3, in Double Plate B. III. & IV.

From La Madelaine.

Fig. 3. This long stem of Reindeer Antler, detached by force from the frontal, has been shortened by fracture at its upper end. It is marked with a somewhat deep marginal groove in its middle third. Where the brow-antler projected, the stem is pierced with one hole, as in fig. 4, B. Plate III. & IV.

From La Madelaine.

Fig. 4. This specimen is distinct in character from the foregoing. In the first place, it is made from the beam of an antler of the Stag or Red Deer (*Cervus elaphus*), where the middle branch projected. Next, the base of the horn and the brow-antler have both been cut away, and the butt-end has been thinned down to a simple bevel, until the spongy middle of the antler is exposed. It was probably a common wedge-like implement of some sort, such as are in frequent use among Esquimaux, North-American Indians, and others, for stripping bark, splitting wood, and for other purposes, and, like the bevelled bone figured at page 43 (fig. 26), used also for dressing skins. Somewhat similar implements are figured in Lee's Translation of Keller's 'Lake-dwellings of Switzerland' (1866), pl. 12. fig. 9, pl. 13. fig. 10, pl. 23. fig. 5; and in Lubbock's Translation of Nilsson's 'Stone-Age' (1868), pl. 15. fig. 257. There is no trace in this specimen (fig. 4) of hard blows having been given on the flat-cut end opposite to the wedge-like extremity.

From La Madelaine, where other specimens of these "Rippers" have occurred.

Louveau del. et lith.

Imp. Becquet à Paris.

A. STONE IMPLEMENTS.

A. PLATE XXI.

The five specimens here figured exhibit very different styles of workmanship, from one Rock-shelter—that of Laugerie Haute. Figure 1 was shaped with care, and its sharp tapering point was carefully thinned on both faces. Figure 2 is one of the boldly chipped, flat, symmetrical specimens that indicate the treatment of a master-hand, or, at least, of an experienced Weapon-maker among the Flint-folk. Specimens somewhat like this, but much smaller, have been figured in A. Plates IV. & VI. Figure 3 required but little dressing to reduce its narrow portion to the form of a rough drill. Figure 4 is a very rough production, only distantly resembling the neatly lanceolate and biconvex implement such as fig. 5; but, as its thick edge appears to have been worn down by use, it has served for some definite purpose. Figure 5, though small, belongs to the well-known type of prehistoric implements of chipped stone, more or less oval in outline, and more convex on one face than the other, in which a continuous and undulating cutting edge has resulted from the method followed in chipping the sides. In the full possession of these characters it resembles many of the old implements from the gravel of the Somme and elsewhere much more nearly than the specimen from Le Moustier described and figured above, page 6, A. Plate III. fig. 2, and rather more so than those in A. Plate XVII. figs. 1 & 2, page 78. This small, thick, rough, leaf-shaped type of implement is not an uncommon associate of the more abundant and more highly worked lance-head type at Laugerie Haute.

Fig. 1. A narrow lanceolate implement, formed out of a thickish flake of light-brown subtranslucent flint, by chipping on the outer face; and towards the point (lost by old fracture) the inner face also is somewhat reduced by chipping. Mottled grey all over by weathering.
From Laugerie Haute.

Fig. 2. A fragment of a large, thin, lanceolate implement of brownish-grey, granular, subtranslucent flint; made by bold chipping on both faces. It is

impossible to say what the implement was when entire. The notch on the left-hand edge of the figure is due to accidental fracture.

From Laugerie Haute.

Fig. 3. A thick tapering drill or rimer, formed of a three-faced flake taken from the outside of a somewhat worn nodule of dark-grey flint. It retains two patches of the exterior, and is weathered dull white and motley grey. This implement is shaped conveniently for being held in the hand.

From Laugerie Haute.

Fig. 4. A roughly lanceolate implement of brownish subtranslucent flint; thin, sharp, and rugged along one edge, thick and crushed on the other. Very slightly glazed by age, and retaining a triangular patch of the old, smooth, yellowish surface of the flint block from which it was chipped. The thick edge seems to have been reduced and blunted by use; the hollow curve between this thick edge and the point is not worn; but the somewhat convex opposite edge has possibly been used.

From Laugerie Haute.

Fig. 5. A somewhat neatly shaped, small, lanceolate implement, boldly chipped on both sides, one of which is nearly flat, the other being more convex (the side shown in the figure). White and opake by weathering; but the flint is light-brown and subtranslucent within, as may be seen by a strong transmitted light; and it is cavernous here and there with little quartz-geodes. The edge is perfect all round, and unworn, exhibiting the characteristic undulating line left by the alternate right and left chips that have produced the edge in this kind of stone implement.

[The figure is 2 millimètres deficient in breadth at the broadest part of the specimen.]

From Laugerie Haute.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1*.	73?	2·874?	27	1·063	10	0·394
2†.	95?	3·740?	65?	2·559?	10?	0·394?
3.	110	4·331	35	1·378	17	0·669
4.	83	3·268	38	1·496	17	0·669
5.	78	3·071	42	1·654	12	0·512

* Broken at the point. † A fragment.

Louveau del. et lith.

Imp Becquet à Paris.

A. PLATE XXII.

Fig. 1. A large, highly arched flake of drab-coloured, granular, opake flint; carefully rounded by chipping at one end (uppermost in the figure), and dressed at the other to an obliquely rounded solid edge (not seen in the figure), which has been crushed, possibly by use. One of the lateral edges is roughly indented, apparently by accidental blows; the other edge is partly untouched, and in part affected by minute chipping, such as may have been caused by partial use in scraping.

From Laugerie Haute.

Fig. 2. A large, thick, simple flake of brown subtranslucent flint, weathered greyish, and retaining some of the original crust. It is roughly triangular in section for more than half its length, where the ridge-face has three facets. The remaining portion has externally the irregularly rounded outline of the original block. One edge is almost smooth; the other is somewhat chipped by accident, and possibly by use.

From Laugerie.

Fig. 3. The pointed end of a large thick flake of brown subtranslucent flint, triangular in section, somewhat weathered. Considerable pains have been expended in chipping this massive pick-like implement into shape. The remainder of the instrument, broken off by an old fracture, can be only a subject for conjecture.

From Laugerie Haute.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	155	6·102	50	1·968	15	0·591
2*.	225	8·858	52	2·074	22?	0·866?
3†.	110?	4·331?	55?	2·165?	28?	1·102?

* We have not been able to measure the thickness of the butt-end. † A fragment.

A. PLATE XXIII.

We have here (1) a small Mortar-stone of sandstone*, (2) a piece of naturally hollowed sandstone, which may possibly have served as a kind of Mortar, (3) a Rubber of soft stone, and (4) a Mortar-stone of quartzite. Les Eyzies, La Madelaine, and Laugerie Basse have yielded these interesting relics of the Cave-folk, connected certainly with their habits of life, though not easy of exact definition as to their uses.

We have already (at pages 59–62) stated almost all we know about these Mortar-stones; but we may add that M. Leplay, Commissioner-General of the International Exposition of 1867, has informed us that he has seen in the Ural region of Siberia stone Mortars, similar to those from La Madelaine and Les Eyzies, used by the children for breaking Hazel-nuts and crushing the seeds of the Cembro Pine†. Mr. Franks has shown us a sketch of a similar round Mortar-stone from Guinea (Africa), $2\frac{3}{4}$ inches in diameter, $1\frac{1}{4}$ inch thick, with a hollow $1\frac{1}{2}$ inch wide and $\frac{5}{8}$ inch deep.

With respect to the Rubber-stone, we may mention that at the Exposition of 1867 we saw two round flat stones, exhibited by Mr. Lawrence Butler, of Missouri, one of which (consisting of brecciated yellow jasper with a dark-brown siliceous matrix, and $3\frac{1}{2}$ inches in diameter and $\frac{3}{4}$ inch thick) had been worn quite smooth, and was said to have been used in dressing skins; the other (of granite $2\frac{1}{4}$ inches in diameter) was a knapping-stone, having a small hollow chipped out on each face, and the edge worn all round. This (and the other also, perhaps) was said to have been used for bruising the grains of maize‡.

It may be desirable to add that we have not seen among our Cave specimens any sufficiently symmetrical, or cheese-shaped, orbicular stones at all comparable to the playing-stones used by the Sandwich Islanders and the North-American Indians.

* Already referred to at page 61, note.

† We have been informed also that at Agra and elsewhere in India pellets of clay, used for shooting from the pellet-bow, are rounded by hand in small hollows excavated in stones; and also that children's playing-marbles are there made by manual labour in such little cavities, being rounded by a continued rotatory rubbing with water in the hollow of the stone.

‡ M. Mortillet refers to these two specimens as "Mortars," but evidently without good reason, in his 'Matériaux pour l'histoire de l'homme,' 1867, p. 354.

Lowenstein del. et lith.

Imp. Becquet à Paris.

Fig. 1. A small, subglobular, smooth pebble of fine-grained siliceous sandstone, dull, drab-coloured, and finely micaceous, on one face of which a round hollow has been chipped out. It is imbedded in a piece of the Hearth-stuff or Bone-breccia, composed, as usual, of stalagmite coloured by carbonaceous matter and enclosing fragments of bones, with small chips of flints, minute flakes of mica, &c. In the breccia, under the pebble, is also seen a piece of bright-red soft hematite—red ochre. [The pebble is rather larger and more oval, longer transversely by 3 millimètres, than shown in the figure.]

From Les Eyzies.

	French millimètres.	English inch.
Diameter, long	43	1·693
„ short	40	1·575
From the base of the hollow to the other face of the pebble	31	1·220
Depth of the hollow	4	0·157
Diameter of the hollow, long	23	0·906
„ „ short	21	0·827

Fig. 2. A water-worn irregular-shaped fragment of softish, friable, grey sandstone, bearing a part of the natural impression of a Bivalve Shell that had ribs and prickles, such as *Spondylus Santonensis*; but the markings caused by the ornament of the shell have been nearly obliterated, either by the natural action of water, or by artificial rubbing,—probably by both. Some slight ferruginous stains remain in little hollows in the cavity; but they may be due rather to the imbedding material than to the use of this saucer-like stone as a paint-mortar or ochre-pot. The sandstone is quartzose and glauconitic, with a calcareous cement; and, besides the cast of *Spondylus*, it contains small fragments of Bivalve Shells, with other obscure traces of fossils. Doubtlessly it was derived by natural agency from one of the Cretaceous rocks traversed by the Vezère and the Dordogne; and indeed it may be from the sandstone near Montignac: see page 31.

From La Madelaine.

	French millimètres.	English inches.
Length	70	2·756
Breadth	60	2·362
Thickness	35	1·378

Figs. 3 *a* and 3 *b*. An oval pebble of soft, grey, finely micaceous clayslate, worn down (by rubbing) on both faces into nearly flat and very smooth, oblique, and slightly curved surfaces not reaching nearly to the periphery, nor of exactly

the same outline as the pebble. One of the rubbed faces (that shown in the figure) is to the outline of the stone as 9 : 12 and 8 : 10; the other is as 18 : 24 and 15 : 20. The surface all over has a dirty red aspect (deep-red mixed with dark bluish-grey); under a lens, in sunlight, it glitters with minute specks of mica; some irregularities on one surface contain reddish sand-grains, loosely impacted, with micaceous dirt; and both of the smooth surfaces show transverse striæ. [The cross lines of a former set of striæ, so plainly marked on the left hand of fig. 3 *a*, are barely visible.]

This has been a Rubber, without doubt; and sandy materials have been acted on (intentionally or otherwise), as the striæ and the lodged sand-grains indicate. The red colour at once suggests that hematite has been ground down with this implement, the colour being general over the surface, though stronger on the much smoothed planes; and on the removal of the surface by a knife, only grey, minutely speckled with red and brown, appears. (By inadvertence, after a superficial examination only, this interesting specimen was mentioned as a "flattish oval pebble of dirty-red jasper" at page 61.)

From La Madelaine.

	French millimètres.	English inches.
Diameter, long	75	2·953
„ short	65	2·559
Thickness	28	1·102

Figs. 4 *a* and 4 *b*. An oval and flattish pebble of quartzite, nearly white within, and brownish outside. A round shallow hollow has been neatly chipped and ground out of the middle of one surface,—small faint pits (apparently due to chipping) remaining within the hollow towards the margin, whilst the middle is smooth or nearly so. The hollow was excavated after the discoloration of the exterior of the pebble, and is not itself at all stained. The opposite face of the pebble is somewhat bruised about the middle, just where it touches the ground when at rest.

From Laugerie Basse.

	French millimètres.	English inches.
Diameter, long	200	7·874
„ short	142	5·591
Depth of the hollow	5	0·197
From the base of the hollow to the other face	40	1·575
Diameter of the hollow, long	45	1·772
„ „ short	42	1·654

Louveau del. et lith.

Imp. Lecouvet à Paris

A. PLATE XXIV.

We have here a series of two sorts of those Implements termed "Scrapers"*, such as wholly occupy A. Plates VII., X., and XIX. and occur also in some of the other A. Plates, being dressed portions of flakes, with either more or less oblong or more or less ovate outline, and having either one or both ends neatly dressed to a semicircular or elliptical edge. None on this Plate have had the tang produced by sharp lateral fracture of the edges, like most of those in A. Plate VII. Some "Scrapers" appear to have been used at one end or the other; but others have their ends unaffected by wear, whilst one or both of their lateral edges have been much worn. See also pages 22, 35, 83, 85, &c. In this Plate, figs. 1–9 have only one end broadly rounded with the usual solid edge,—the other end either tapering to a blunt point, or reduced to a narrow irregularly rounded apex, its lateral edges having been chipped away towards the narrow end more or less symmetrically. In either case the shape of the original flake has frequently had an influence in determining the formation of these tapering, acute-ovate, or pear-shaped Scrapers; and a remnant of the bulb of percussion is sometimes still present, especially in figs. 1, 2, 4, and 6, though of course not visible on the surfaces (ridge-faces) shown in the Plate. All the specimens figured here are more or less arched.

It is impossible to make a distinct separation between the tapering and the oblong forms: thus fig. 11 has, and figs. 5 and 12 probably have had, neatly rounded solid edges at each end; and the unequal size of the ends in these Double Scrapers alone separates them from the more symmetrically oblong specimens.

The Implements figured on this Plate show more or less the effects of weathering, either in discoloration or glazing of the surface.

Fig. 1. Dark-coloured spicular flint. Obliquely acute-ovate; slightly worn on the oblique side and rounded end.
From Laugerie Basse.

Fig. 2. Dark-grey spicular flint, retaining a portion of the crust of the narrow end. High-backed and rough; worn at the round end.
From Les Eyzies.

* Also termed "Thumb-flints" by English archæologists, who find analogous implements, both on the surface and accompanying very old burials, in Yorkshire and elsewhere.

Fig. 3. Light-brown, subtranslucent, mottled outside. Broad, spatulate, high-backed, rounded at the ends, both of which have been partially crushed.
From Laugerie Haute.

Fig. 4. Opake shining white (weathered), with light-brown subtranslucent spots of the unaltered flint. Neatly subovate, with straightish sides and bluntly pointed apex; edge worn.
From Laugerie Haute.

Fig. 5. Grey-mottled (weathered) granular flint. Short and thick; edges intact; ends worn.
From Les Eyzies.

Fig. 6. Subtranslucent brown flint. Well worn at the side-edges, and crushed at the ends.
From Laugerie Basse.

Fig. 7. Greyish brown. Neatly shaped; acute-ovate or subtriangular.
From Laugerie Haute.

Fig. 8. Another, but larger, neat subovate Scraper of greyish-brown flint.
From Laugerie Haute.

Fig. 9. Subtranslucent, greyish-brown, granular flint, mottled by weathering. Neatly oblong; rounded at one end only; less carefully trimmed at the other; worn on the lateral edges.
From Les Eyzies.

Fig. 10. Dark-coloured spicular flint. High-backed; ends not quite equally rounded; worn on the side-edges.
From Laugerie Haute.

Fig. 11. Dark-grey, mottled (weathered), fossiliferous flint. Piece of a thin flake, with a small patch of the crust remaining near one end; ends unequally rounded.
From Laugerie Haute.

Fig. 12. Dark-brown, coarse, spicular flint. Probably once oblong; evenly worn on one edge; roughly and unevenly worn away on the other, especially towards the narrower end, where hard scraping and other usage has destroyed

the symmetry of the implement; the other end is somewhat crushed at its edge.

From Laugerie Basse.

Fig. 13. Brownish-grey, granular, Polyzoan flint, mottled by weathering. An almost symmetrical Double Scraper, slightly worn by use on some parts of its edges.

From Les Eyzies.

Fig. 14. Light-brown, narrow, symmetrical Double Scraper; worn on the side-edges, and somewhat crushed at the larger end.

From Les Eyzies.

Fig. 15. A small Double Scraper of light-brown subtranslucent flint, with partially opake exterior; edges somewhat worn.

From Laugerie Haute.

Fig. 16. Side-view of a neat oblong Double Scraper of subtranslucent light-brown flint; edges worn by use (scraping), especially at the sides.

From Laugerie Basse.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	57	2·244	35	1·378	11	0·433
2.	60	2·362	30	1·181	17	0·669
3.	80	3·150	38	1·496	14	0·551
4.	55	2·165	31	1·220	9	0·354
5.	46	1·811	27	1·063	10	0·394
6.	55	2·165	24	0·945	8	0·315
7.	46	1·811	29	1·142	8	0·315
8.	76	2·992	49	1·929	15	0·591
9.	52	2·074	24	0·945	7	0·276
10.	51	2·008	25	0·984	10	0·394
11.	57	2·244	31	1·220	7	0·276
12.	60	2·362	22	0·866	6	0·236
13.	69	2·717	28	1·102	9	0·354
14.	71	2·795	22	0·866	8	0·315
15.	44	1·732	18	0·709	7	0·276
16.	54	2·126	27	1·063	10	0·394

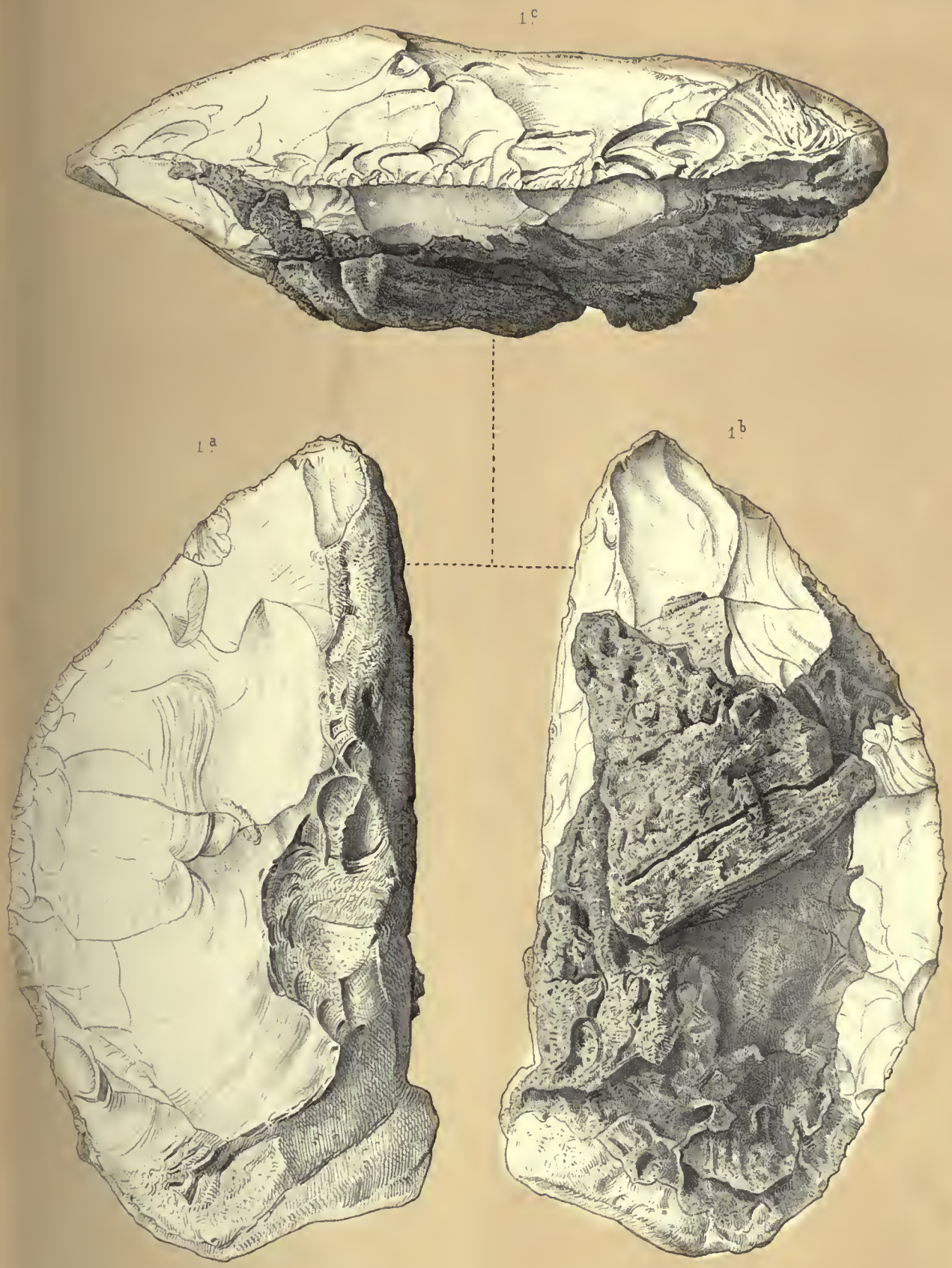
A. PLATE XXV.

This Plate shows three views of one of the Chopper-like Implements common in the Cave at Le Moustier, but occurring also at Les Eyzies and La Madelaine*. See page 17 and A. Plate V. In this as in other instances, a part of the original surface of the flint block remains, one margin only having been chipped into shape, as a trenchant edge, boldly curved, and reaching from the sharp apex of the Chopper to within a short distance of the blunt end ($5\frac{3}{4}$ inches in diagonal distance; $6\frac{1}{2}$ inches along the curve), this latter extremity and the back of the implement retaining the characters and thickness of the stone. This had originally been a weathered nodule of light-brown flint, broken longitudinally and again weathered (glazed) on what is now the back of the Chopper. The cutting edge was made with many bold strokes and by careful dressing; and its surfaces have been rendered opake and drab-coloured by subsequent weathering. Some of the cave-breccia (stalagmite and fragments of Polyzoan limestone) still adheres to one side of this fine specimen (figs. 1*b* and 1*c*).

From Les Eyzies.

	French millimètres.	English inches.
Length	150·3	5·916
Breadth	76·2	3·000
Thickness	32·3	1·666

* The Blackmore Museum, at Salisbury, possesses a flint Chopper, like the above, that was found at Icklingham, and another (less neatly shaped) from Bury-St.-Edmund's, both in the Valley of the Lark, Suffolk. Mr. John Evans, F.R.S., has specimens with much the same characters from the Valley of the Little Ouse, Norfolk, from gravel at Bournemouth, Hants, and also from a high-level brick-earth pit in the Valley of the Thames at Highbury. Implements of a similar kind were found by Col. A. Lane Fox., F.S.A., at the Cissbury Camp, in Sussex.



Louveau del et lith.

Imp. Becquet à Paris.

Louveau del. et lith.

Imp. Becquet à Paris

A. PLATE XXVI.

We have here three long, arched, tapering flint flakes, with unworn edges, that may have served for Scratchers or Poignards. One of them, fig. 3, is a simple flake, of the same character as one, from Cro-Magnon near Les Eyzies, already described, page 86, A. Plate XX. fig. 3. The two others differ from the last in that they have been struck off from blocks of flint which had been dressed so as to present one or more long ridges or corners, brought to an angle, along a convex curve, by coarse chipping at right angles to the ridge-line. A smart blow at one end of a ridge thus prepared, in a direction coincident with the long axis of the dressed block, has detached a ridge-flake, parallel with the curved edge, and therefore arched, triangular in section, blunt at the end where the blow was struck, and tapering to a point at the other end, where the force of the concussion died out between the mass of the block and the outer edge of its long corner or ridge.

The large flint "cores" found abundantly in the surface-soil near Pressigny-le-Grand, Dép. Indre et Loire, and so well known as "Livres de beurre," have been well described by Mr. John Evans*, F.R.S., as purposely dressed by lateral chipping to a raised ridge, for the production of long, smooth flakes (9 or 10 inches in length), by blows given at the end of the broad ridge along the middle of the "core," in a direction parallel to the long axis of the stone. The specimens, however, here shown by figures 1 and 2 are corner-flakes, that have been struck from blocks designedly dressed with a strongly convex curve, probably for the further production of long, arched, tapering, and smoother flakes (like fig. 3), after the roughly worked surface of the block had been flaked off, the convexity of the surface giving, in the hands of the practised workman, to the flakes successively struck off an arched form †, highly esteemed, it may be, either for practical value or for fancied grace.

Figs. 1*a* and 1*b*. Two views of a long, narrow, arched "corner-flake" (see above) of dull, purplish-drab, subtranslucent flint, with segments of concentric elliptical bands, faint and reddish, towards the ends of the flake. The back or

* 'Archæologia,' vol. xl.; see also 'Proceedings of the Ethnographical Society,' vol. v. p. 221.

† This graceful curve of arched knife-flakes was much more easily and perfectly obtained by the Aztecs in working Obsidian, their material for stone implements, in consequence of the more perfect "conchoidal fracture" of the stone. See E. B. Tylor's 'Anahuac,' 1861, pages 96 and 98 &c.

outside is high and rough; the concave face is smooth and faintly undulating; the side-edges are sharp, irregular, but nearly parallel, and converge towards a point that has been broken off (upper end in the figures).

From La Madelaine (?).

Fig. 2. A "corner-flake" of light-brown, translucent flint, granular with minute fossils. This is rather less highly arched than fig. 1, and has a slight twist; the ridge is smoother also, having been partly flaked; the inner face is more undulating; the edges are thinner, the flake being broader and the ridge lower, except towards one end (lowest in the figure), which once tapered to a point, probably triangular in section, but lost by an old fracture.

From La Madelaine (?).

Figs. 3 *a* and 3 *b*. A long, arched, tapering, simple flake of translucent, brownish-grey flint, with purplish bands, weathered opake and drab-coloured. It is nearly symmetrical, pointed, and perfect. The ridge-face is composed of several flake-facets; and the inner face (not figured) shows plainly the "bulb of percussion" and numerous segments of the concentric undulations of "conchoidal fracture." This neat and perfect flake is comparable with figure 3 of A. Plate XX., but it is more symmetrical and is gracefully arched.

From La Madelaine (?).

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	193·6	7·625*	22·2	0·8750	12·7	0·500
2.	206·5	8·125†	23·5	0·9375	12·7	0·500
3.	171·4	6·750‡	25·4	1·0000	9·5	0·375

Rough corner-flakes, such as figs. 1 and 2, but mostly smaller and less perfect, are common at both La Madelaine and Les Eyzies, and are not wanting at Laugerie and le Gorge d'Enfer. Mr. J. Evans, F.R.S., has similar flakes, with the chipped ridge, from Denmark.

* Not quite perfect in length. Over the curve 209·5 millims. (8¼ inches).

† Not quite perfect in length. Over the curve 216 millims. (8½ inches).

‡ Over the curve 184 millims. (7¼ inches).

Louveau del et lith.

Imp. Becquet à Paris.

A. PLATE XXVII.

These broad rough flakes, of which only two (figs. 1 and 3) have been dressed at the edges, are chiefly from Le Moustier, fig. 3 being from Laugerie. Figure 2, having no marks of use on it, was probably a waste flake; figs. 4, 5, and 6 appear to have served for temporary use in scraping or cutting flesh, bone, or wood, as one edge at least is slightly worn in each. Figures 1 and 3 have a certain similarity of form, evidently due to design, in their falciform shape, in the notch on the concave edge, and in their shoulder and tang. These two specimens appear to have been prepared for some special use, probably as Side-scrapers; their ends are too blunt for good Spear-heads.

Fig. 1. A portion of a flake of dark-grey flint, dressed to a knife-shape with one edge convex and the other doubly concave; the notch in the upper moiety of the latter is old. The apex is bluntly pointed; the butt is truncate (end of flake) and reduced in vertical thickness, especially at the edges, by chipping. Weathered light-mottled grey, especially on the broad face.
From Le Moustier.

Fig. 2. A simple rough flake of dark-grey and highly spicular flint. The "bulb of percussion," prominent on the flake-face (not shown in the figure), has been partly chipped off. The thin end of the flake (upwards in the figure) is naturally chisel-shaped; but, like the other edges, it is intact.
From Le Moustier.

Fig. 3. A drab-coloured, knife-like, double-edged Scraper, much resembling fig. 1, but rather more symmetrical. The dressed convex edge terminates in a blunt apex at each end; and these are much more nearly alike than in fig. 1. The opposite edge is more equally divided by the prominent part of the flake, and is of nearly uniform thickness throughout. The notch in its longer half is of old date; for stalagmite is attached to its hollow surface. This implement can be very conveniently held between the thumb and bent fingers, with its convex edge exposed, and less conveniently in other positions.
From Laugerie Haute.

Fig. 4. A broad thick flake of grey-brown, subtranslucent flint, retaining on the ridge-face a portion of the original calcareous crust of the flint-nodule. The

butt has been somewhat reduced by chipping. Except where the old crust forms a part of it, the edge is thin at the sides and apex; and it has been used, especially on the straight side.

From Le Moustier.

Fig. 5. A simple rough flake of brownish-grey flint; similar in general character to fig. 2. Somewhat worn on the long edge.

From Le Moustier.

Fig. 6. A broad, rough, simple flake of drab-coloured flint, with adherent stalagmite. The long edge, and the lower and thinner part of the opposite edge, have been slightly used.

From Le Moustier.

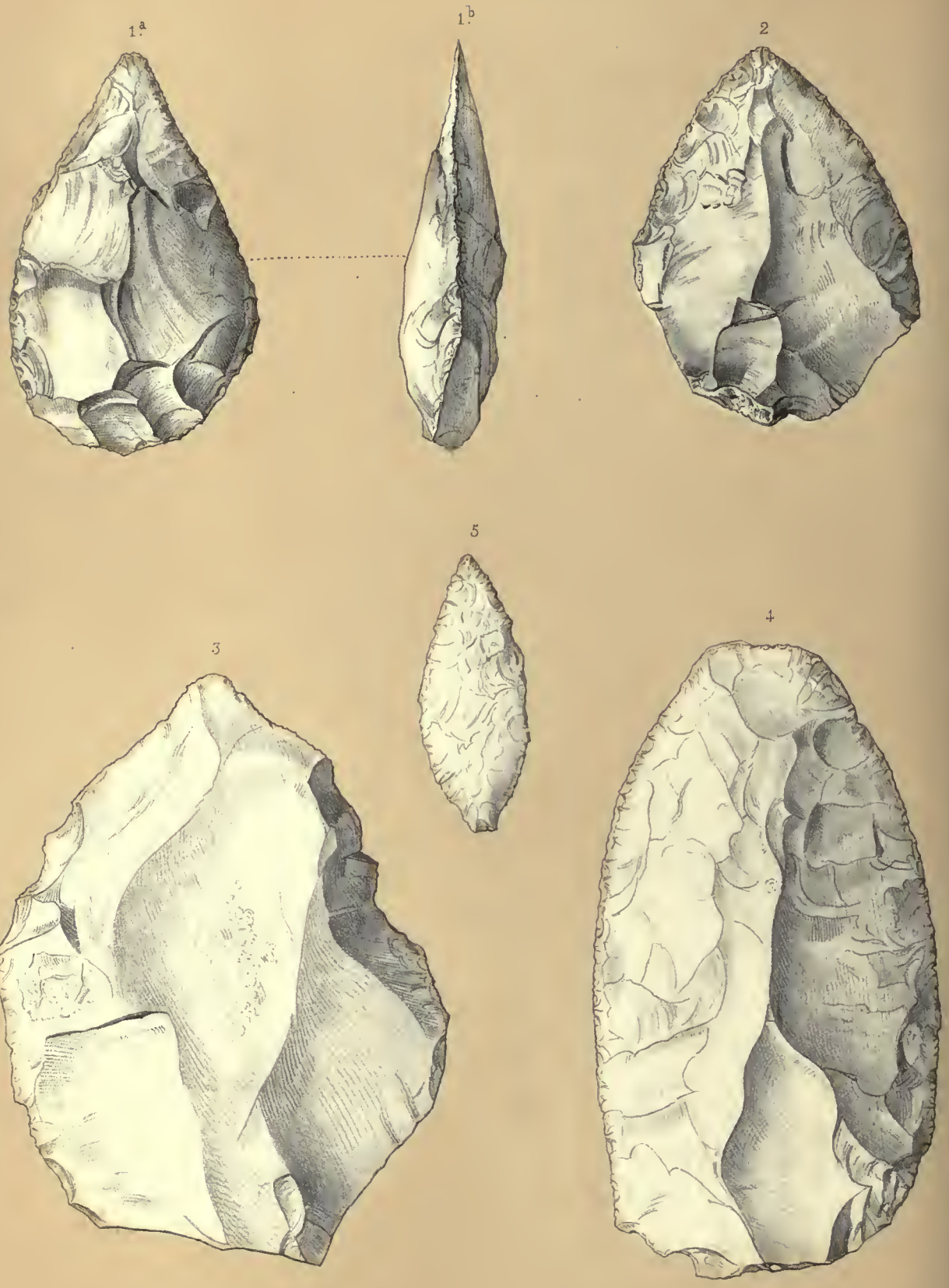
Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	95	3·740	35	1·378	13	0·512
2.	88	3·465	43	1·693	12	0·472
3.	95	3·740	37	1·457	12	0·472
4.	113	4·449	57	2·244	21	0·827
5.	81	3·189	40	1·575	10	0·394
6.	104	4·095	55	2·165	16	0·630

Such rough flakes as figs. 2, 4, 5, and 6, when reduced on the edges by chipping, would supply the extremely numerous subtriangular implements, often crude, but sometimes very neat, and always more or less adapted for scraping, cutting, or piercing, with which the Moustier Cave especially abounded, such for instance as figs. 1 and 2 in A. Plate XII., and figs. 2 and 3 in A. Plate XXVIII.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XXVIII.



Louveau del et lith.

Imp. Becquet à Paris

A. PLATE XXVIII.

Four very different types of flint implements, from the Cave at Le Moustier, are here shown*. Figure 1 is a small, sharp, thin-pointed Spear-head, pear-shaped, biconvex, and chipped all over, of the same type as many of the old implements from the Valley of the Somme and elsewhere. Several specimens of this type, of different sizes, have been found at Le Moustier (see, for instance, A. Plate III. fig. 2, and A. Plate XVII. figs. 1 and 2); and one from Laugerie Haute is figured in A. Plate XXI. fig. 5. A small rough flint Lance-head (?) of this kind was found in Wokey Hole, Somersetshire, by Mr. Boyd Dawkins, and is figured in the 'Geol. Soc. Quart. Journ.' vol. xviii. p. 118. Such a one also has been brought by Mr. Bauerman from the mines of Wady Taibe, in Arabia Petræa. Others, of larger size, have been found in the ancient tumuli ("mounds") of North America; and others were met with by Col. A. Lane Fox, F.S.A., among the flint tools and weapons at the Camp-station of Cissbury, in Sussex; and the same type is common among the implements of quartzite found in India. Figure 2 is somewhat similar to fig. 1, but it is a leaf-shaped piece of flake, dressed on one side only,—and in so much resembles the larger and rougher specimens from Le Moustier, A. Plate III. fig. 1, and A. Plate XI. figs. 1 and 3, and that from Laugerie Basse, A. Plate XI. fig. 2; similarly dressed flakes also, oval and ovate, are associated with the biconvex "Haches" and "Langues du chat" wherever these are found. Figure 3 is a roughly trimmed, lozenge-shaped piece of flat flake, and may also have served as a Spear-head, or as a pointed Axe-blade. Very many of the tools and weapons from Le Moustier have been similarly fashioned from rough flakes, by chipping away their edges, more or less carefully, into triangular, obliquely elliptical, and various leaf-like outlines, the bulb (if remaining) rarely lying in the middle of the butt-end, but on one side or the other of the long axis of the specimen. Indeed fig. 2 really belongs to this category, though it is of superior manufacture. Figure 4 is a neatly chipped and symmetrical piece of a thick flake, and may have served as a Wedge, Chisel, Adze, Axe, Spear-head, or Scraper. Figure 5, a carefully dressed long-ovate Arrow-head, belongs to a type known by this specimen only (if correctly localized) at Le Moustier, where small implements, even small flakes, are not usual. It belongs to the same category as the well chipped weapon-heads from Laugerie Haute, figured in A. Plate IV.

* There is some doubt as to the locality of fig. 5.

Figs. 1*a* and 1*b*. Blackish-brown, glazed flint. Boldly chipped all over. Neatly pear-shaped. Edge entire, and very thin at the apex. [The rounded butt has not quite its full dimensions given in the figure.]

From Le Moustier.

Fig. 2. Blackish-grey flint, slightly glazed. Leaf-shaped or acute-ovate; sharp-edged, pointed, and symmetrical at the apex; rough at the butt. Very carefully dressed out of a flake, the "bulb" of which, situated under the rough portion in the lower left-hand portion of the figure, and oblique to the long axis of the weapon, has been reduced by chipping. This is a remarkably symmetrical example of the flake tools so common at Le Moustier, and found, indeed, more or less abundantly even in the surface-soil of the British Islands and elsewhere; to such implements we have already alluded at pages 117 and 119.

From Le Moustier.

Fig. 3. Mottled grey by weathering; roughly rhomboidal; thin-edged at the apex (two opposite parts of the edge have been freshly fractured). The butt is where the "bulb" was broken away.

From Le Moustier.

Fig. 4. A piece of a straight, thick, broad flake; grey-mottled; slipper-shaped; smooth and subconvex below, ridged above; carefully trimmed along its slightly convex sides and broadly chisel-shaped apex to a uniform solid cutting edge. The butt is truncate (the flake-end), and has been thinned by chipping above and by the removal of the "bulb" below.

From Le Moustier.

Fig. 5. Translucent light-brown flint, whitened and opake by surface-change. Elongate leaf-shaped, with a tolerably sharp apex and a short stalk-like tang. Symmetrical and thin, having been carefully chipped on both faces.

From Le Moustier (?).

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	71	2·795	46	1·811	17	0·669
2.	65	2·559	48	1·890	15	0·591
3.	101	3·976	78	3·071	17	0·669
4.	108	4·252	55	2·165	13	0·512
5.	47	1·850	18	0·709	4	0·157

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XVII.

Louveau del et lith.

Imp. Becquet à Paris.

B. BONE IMPLEMENTS, &c.

B. PLATE XVII.

Fig. 1. The broken bone of a Bird (the radius of a Crane, perhaps); the upper third is wanting. The lower articular extremity is too much damaged to allow of exact definition of the species. The bone does not appear to have been cut with a saw; but the splintery edge of the fractured bone seems to have been beaten down. The shaft bears throughout some fine longitudinal lines, indicating that the bone has been scraped with a sharp and faintly notched tool, showing the effect that we should expect to see produced with the sharp edge of a piece of broken glass. Subsequently to these, the bone has been marked, in the upper part, with several oblique transverse notches, plainly visible in the figure; and below these there is a group of lines cut across in different directions, one longitudinally, and others obliquely. On the opposite surface, the upper notches are reproduced, but more neatly disposed in zigzag, and in such a way as to represent a series of very angular chevrons, of which one of the strokes is always more marked than the other. We do not propose any interpretation for these marks or different combinations of notches, which could scarcely have had an intentional meaning.

Although we have figured this hollow bone on the same Plate with the Sewing-needles, because as a little cylinder, hollow to the base, it is capable of holding three or four of the most delicate of our bone Needles, yet we do not wish to state it as a certainty, or any thing more than a possibility, that this may have been employed for the same purpose as the needle-cases of our own or of ancient times.

From Les Eyzies.

Fig. 2. The lower part of the metacarpal bone of a Reindeer, represented by its posterior face. At *a*, above the projecting ridge of one of the articular condyles, are two transverse notches, indicating the spot where the tendon, intended to be used for sewing-thread, must have been cut, as above said (at pages 131 and 138).

From La Madelaine.

Fig. 3. The upper portion of a metatarsal bone of a Reindeer, represented by its

anterior surface. In this very compact part of the bone, we see the large vertical crevice made by sawing away long thin plates or spillets of hard bone fit for being made into Needles.

From La Madelaine.

Fig. 4. A tarsal bone of a Reindeer, the cubo-scaphoid of the right side. Its anterior surface is marked with several transverse notches analogous to those (shown at *a*) in the lower part of the Reindeer's metacarpal (fig. 2). These notches have most probably been produced, as in the former case, by the edge of the tool used in cutting away the tendons.

From Laugerie Basse.

Fig. 5. This is a small rounded rod of Reindeer antler, of which one end is broken, and the other marked with blunt lateral projections and notches.

Neater notches are seen on the somewhat similar specimens, figs. 21 and 22, which were probably intended for the same use. It was thought at first that instruments of this form might have been used in some kinds of knitting and netting (Comptes Rendus, 1864, vol. liii. p. 404); but subsequently, since this Plate was drawn, perfect specimens have been found, ending in a sharp point, and hence regarded as weapon-heads, to be tied on the shafts of javelins, for instance. See above, pages 68 and 71, and B. Plate X. fig. 4.

From Les Eyzies.

Fig. 6. Fragment of an undetermined implement of Reindeer antler, on which we think we recognize an engraving of a human hand with part of the forearm covered with a kind of ornamental clothing. See, for more details, page 137; and compare B. Plate IX. figs. 1*a* and 1*b*, page 69.

From La Madelaine.

Figs. 7, 8, 9, 10, 11, and 12. Needles of different lengths, most of which seem to be made of Reindeer antler. Figs. 7 and 12 have their eyes broken.

There is some difficulty in supposing that such long and thin Needles of bone could have resisted the necessary pressure in piercing the twofold thickness of skins to be joined edge to edge by overcasting or any other mode of sewing. At present such long needles are used for other purposes, of which we have spoken above, pages 135 &c. We leave the reader to choose for himself the interpretation which he thinks the most proper.

All these Needles came from the Station of La Madelaine.

Figs. 13, 14, 15, and 16. These are well-proportioned Needles, of more finished workmanship, and carefully polished. The bony substance is very compact in fig. 16, in which the eye, having been broken, has been re-made, the old fracture of the end remaining visible. This Needle seems to have been made of a flake of very compact Bird's bone. It is not rare with us to find Needles that have been made of Bird's bone; and they may be recognized at the first glance, because, instead of being regularly rounded throughout, they remain flattened even in the roundest portion of their stem. We have already illustrated at page 135 (Woodcuts, figs. 53 and 54) two other Needles, in which the piercing of the eye is complete in one, and only begun in the other.

These Needles came in great part from La Madelaine.

Figs. 17, 18, 19, and 20. Needles, of which the point has been broken, and re-made with more or less care. In figs. 18 and 20 the new point seems to have been made by simple lateral cuts.

From La Madelaine?

Figs. 21 and 22. These specimens are regarded as analogous to fig. 5, described above, page 122.

From La Madelaine.

Fig. 23. The lower extremity of the metacarpal of a Horse. On the figured surface are a certain number of longitudinal notches made by various saw-cuts, so as to remove such spillets as were suitable for the manufacture of Needles. We know that the leg-bones of the Horse are very compact in tissue; and we have experimentally proved that a Needle made of a fresh bone of a Horse will easily pierce the double thickness of a skin glove.

From La Madelaine.

Fig. 24. The laterally notched point of an implement which some would recognize as a kind of knitting or crochet needle; but is it not more likely to be the point of a small barbed Harpoon-head? (Compare B. Plate VI. figs. 7, 8, and 9; p. 57.)

From La Madelaine.

Fig. 25. Part of another small bluntly notched implement made of Reindeer antler, and similar to fig. 22. The tapering end in the figure bears on one side three shallow irregular notches. Its use is unexplained.

From La Madelaine.

B. PLATE XVIII.

Fig. 1. This is an implement made of Reindeer antler, the use of which seems to us difficult to explain. The surface shown in fig. 1*a* is convex; and the opposite one is flat, as seen in fig. 1*b*. The surface shown in fig. 1*a* is marked along the middle throughout most of its length by two parallel close-set lines; and on each side of these median lines are carved in relief two series of rhombs, obliquely set, alternate on either side. On the larger moiety of the surface (left-hand, in the figure) there is an ornamental border-line of continuous zigzags or chevrons, such as occurs very often in works of art of the Reindeer Age. The upper and tapering extremity of this implement is marked with some oblique scratches, in pairs, but unequal and shallow; the lower end has six long, vertical, parallel, and nearly regular notches.

On the opposite face (not figured) this specimen shows for the greatest part of its length a large number of shallow notches, obliquely diverging to the right and left of a median line, some pointing towards the top and others towards the butt of the instrument; and this lower end is hollowed, for from 15 to 18 lines, with a broad and shallow groove.

From Laugerie Basse.

Fig. 2. Another implement of Reindeer antler, convex on one side and flat on the other. Its ends taper to bluntish points: the end uppermost in the figure is shaped by lateral cuts; the lower end is plano-convex with thin edges. The middle of the convex face is cut into two series of broad irregular notches, alternating on either side of a narrow median ridge, and separated one from another by bold nodular eminences*.

The opposite face (not shown in the figure) is flat in its breadth and slightly convex longitudinally: it is scored with numerous transverse lines, at unequal distances.

The use of this specimen is uncertain. [Possibly it may have served as a spike lashed on obliquely to the bevelled end of a shaft, such as Australian and South-American savages use in many of their single-barbed spears and javelins (see also p. 58).—T. R. J.]

From Laugerie Basse.

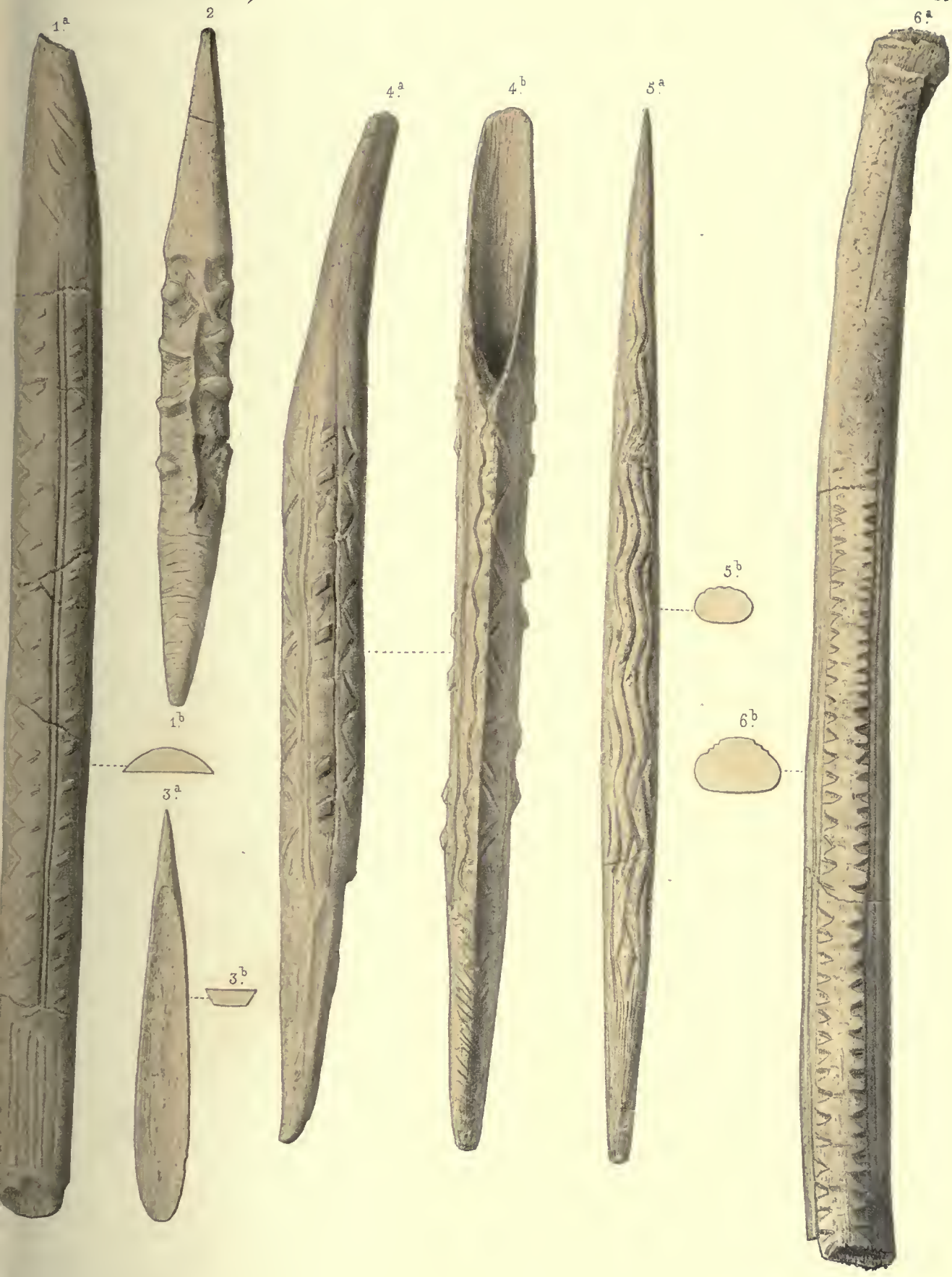
Fig. 3. An implement of Reindeer antler, tapering in its upper fifth to a sharp

* This specimen was figured in outline in the 'Revue Archéologique,' 1864.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XVIII.



veau del. et lith.

Imp. Becquet à Paris.

point, and flattened on either face (see fig. 3 *b*) for the rest of its length, but cut away more on one side than the other, so that it thins away at its broad, thin, and rounded butt. It is thus suited for being spliced, with its broadest and oblique surface, on the bevelled shaft of such a weapon as a javelin, forming its straight point. Or it may have constituted a portion of a fishing instrument; in which case the point would be turned inwards on a curved stem (see p. 51, fig. 14), and would have the effect of the barb in such a fish-hook, made of two pieces, as those still used by some savages. See pages 55 and 58.

From La Madelaine.

Fig. 4. The specimen of which two faces are here illustrated is also made of Reindeer antler. For this implement various uses have been suggested, none of which as yet have appeared quite trustworthy. In its middle portion this specimen is highly ornamented with carvings in relief and with engraved lines, which are carefully shown in the figures*. One of the surfaces, represented by fig. 4 *a*, shows distinctly a median longitudinal keel, or salient line, whilst the opposite side (not figured) is, on the contrary, engraved with a corresponding hollow line. Though the different ornaments are not identical on all the surfaces, yet they are approximately symmetrical.

One extremity of the specimen ends in a blunt point, one of the sides of which has decayed away (see the lower part of fig. 4 *a*). The other end, as shown in fig. 4 *b*, is carved into a kind of beak, grooved with a hollow deep enough to hold a certain quantity of more or less solid substance, such as fat or marrow. Hence some have thought that this specimen might have been a *marrow-spoon*, more or less analogous to such an implement as, according to travellers, the Esquimaux make use of to extract the marrow from the large cavities of long bones. We notice this interpretation of the possible use of this specimen (which, however, we regard as very hazardous) because it has been the impression of many who have examined it. [Viewed as being figured upside down in the illustrations here given, this specimen is analogous to a very common type of spear-head, in which the butt-end is hollowed for the reception of the pointed shaft, such as are and have been used by various savages all over the world.—T. R. J.]

From Laugerie Basse.

Fig. 5. A weapon-head made of Reindeer antler, tapering at the ends and thicker along the middle, which, however, is not quite cylindrical, as seen in the section

* Figured also in the 'Revue Archéologique,' 1864.

shown by fig. 5 *b*. The more convex surface, which is represented in our Plate, is engraved with several nearly regular, undulating, and rather deep, longitudinal lines. The upper extremity is round in section and carefully pointed. The lower end is less carefully tapered, and may have been intended simply for insertion into the terminal hollow of a shaft; and thus the instrument may be regarded as a pointed javelin-head*.

From Laugerie Basse.

Figs. 6 *a* and 6 *b* illustrate a large portion of a carved stem of Reindeer antler, irregularly rounded on one face and flattened on the other; the latter, however, is defaced by decay and somewhat reduced. The greatest portion of the convex surface presents along the centre a longitudinal band, left projecting (as shown in fig. 6 *b*) by two sunken lines on either side; and the band is itself cut at its edges with numerous triangular notches, which give the effect of two borders of chevrons. The carving is somewhat carelessly done. The instrument must have been longer, for both ends bear the marks of ancient fracture. It would be difficult to offer any suggestion as to its intended use.

From Laugerie Basse.

* This specimen also has been figured in the 'Revue Archéologique,' 1864.

Louveau del. et lith.

Imp. Becquet à Paris.

A. STONE IMPLEMENTS.

A. PLATE XXIX.

Fig. 1. A piece of quartzose schist, already figured elsewhere* as bearing on it a representation in faint outline of the fore part of a Herbivore, with very doubtful indications of horns; whilst the eye is simply indicated by a dot, and the legs are rather confusedly drawn.

From Les Eyzies.

Figs. 2 *a* and 2 *b*. A small calcareous pebble, flat on one side, and irregularly convex on the other; it is marked with a great many lines radiating in different directions (probably with the sharp edge of a flint), of which we do not try to guess the meaning.

From Les Eyzies.

Fig. 3. A pebble of leptinolite, perceptibly concave on one side, and convex on the other, and bearing on its two faces certain combinations of lines. On the side figured we may, with a little effort, recognize the rudiments of an animal form incompletely defined.

From Les Eyzies.

Fig. 4. A portion of an elongate pebble of limestone, broken across one of its extremities by a recent fracture. It also bears on its two faces numerous transverse, more or less parallel lines, made by a sharp instrument.

From La Madelaine.

Fig. 5. An irregular-shaped slab of mica-schist, on which can be distinguished the remains of the outlines of an animal, whose species is sufficiently indicated by the antlers placed in front of the forehead, which, it is known, particularly characterize the Reindeer. This figure, engraved with a sharp point, must have been originally more perfect; and even since the piece of schist has been broken, one recognizes on the part where the head and neck of the animal were continued, numerous fine scratches, probably produced by repeated friction

* "Cavernes du Périgord," in the 'Revue Archéologique,' 1864.

with some instrument sharpened upon it. These striæ are sufficiently well marked in the figure.

Such stones, with engraved figures of animals, were very rare in 1863, when we found those here figured. But since then some have been found at other Stations of the same Reindeer Period, and especially at Bruniquel (Dép. Tarn et Garonne), by M. Peceadeau de l'Isle, to which we hope he will soon give publicity.

From Les Eyzies.

Fig. 21.

A Double Awl or Graver. From La Madelaine.

Each end of this flake has been crushed down or worn away into two irregular notches, on either side of a bluntish point. The chipping and crushing force has been applied on one surface only, namely the flat face of the flake, as may be seen in the outlines.

Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE XXX.

The pieces of stone here figured have been used in grinding and polishing. Figure 1 appears fitted for polishing flat and grooved surfaces of wood or bone, or for flattening seams in sewn skins. Figures 2, 3, 4, and 5 are of soft sandstone—such as the Cretaceous strata of the Valley of the Vezère supply,—and have evidently been used in the rounding and sharpening of splinters and spillets of bone, intended for needles, awls, arrow-heads, &c. (see p. 133).

Fig. 1. A thin flake of limestone, somewhat polished on its two faces and its rounded edge. The figured surface is slightly concave, as if it had been used for sharpening or polishing some not very hard substances.

From —— ?

Fig. 2. An angular fragment of brownish-yellow friable sandstone, consisting of quartz grains loosely cemented with carbonate of lime. Besides the five grooves shown in the figure, there are four similar on the other side, having the same direction, but somewhat more divergent and deeper.

From La Madelaine.

Fig. 3. Portion of a long thin grindstone of soft, drab-coloured, fine-grained sandstone (not calcareous), deeply worn on both faces and irregularly rounded on the edges. It seems to have been broader once: former grooves on the opposite faces have met, dividing the stone longitudinally; and the specimen has been broken across, at the lower end of the figure, by a recent fracture. Three grooves are shown in the figure,—one deep and narrow, one broad, and the trace of a third. The other face is scored with two deep longitudinal grooves (one of which undercuts the intervening rounded ridge), and a fainter groove. See Woodcut, fig. 22.

Fig. 22.

Outline of the lower end of fig. 3.

From La Madelaine.

Fig. 4. An angular fragment of brownish-grey, friable, siliceous sandstone, deeply grooved on the face that is figured, and irregularly scored here and there on the other face and edges.

From La Madelaine (?).

Fig. 5. A fragment of flat-bedded, yellowish, friable, quartzose sandstone, with calcareous cement and slightly micaceous. Worn on one side, as shown by the figure; the other parts retaining their natural surfaces. [The figure is rather too small in the lower part.]

From La Madelaine.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	56	2·205	32	1·260	(?)	(?)
2.	70	2·756	45	1·772	18	0·709
3.	42	1·654	25	0·984	10	0·393
4.	75	2·953	68	2·677	32	1·260
5.	97	3·819	100	3·937	32	1·260

Fig. 23.

An Awl or Graver. From La Madelaine.

The blunt point in this implement has been formed by the two edges at the end being crushed down, or worn away by scraping, on one side from the flake-face (making the notch), and on the other from the ridge-face.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XXXI.

Louveau del. et lith.

Imp. Becquet à Paris

A. PLATE XXXI.

These are common flint flakes, of which some are more or less dressed into shape, such as figs. 3, 5, and 11; and these, with figs. 1, 2, 4, 6, and 9, may have been intended for heads of weapons. Figure 8 is either a double-pointed weapon-head, to be lashed on obliquely, serving for both point and barb (like some bone specimens, pages 58 and 124), or it has been a scraping-tool in the hands of the old carver of bone and wood.

Fig. 1. Simple flake; brownish-grey, minutely chipped at the edges, on alternate sides, perhaps by slight use as a scraper.
From Les Eyzies.

Fig. 2. Simple flake; translucent, brown.
From Laugerie Basse.

Fig. 3. Triangular flake, translucent, brownish; weathered grey. Somewhat shaped towards the point, and narrowed at the butt, by a slight dressing.
From Les Eyzies.

Fig. 4. Simple flake, dark grey; edges minutely chipped here and there.
From Les Eyzies.

Fig. 5. Narrow flake of grey and granular flint; shaped at point, butt, and one side, by careful chipping on the face not shown in the figure.
From Laugerie Basse.

Fig. 6. Narrow, thick, simple flake of dark-grey, mottled, spicular flint, chipped on the convex edge near the point.
From Les Eyzies.

Fig. 7. The larger portion of a broad, thin, arched flake; brownish-grey and mottled. [The dotted lines in the figure are probably more than half too long.]
From Les Eyzies.

Fig. 8. Dark brownish-grey, mottled flake, shaped and worn. The point uppermost in the figure has been made by both sides having been chipped and worn away at right angles to the lower face; but the lower point has lost the sides

by chipping on the alternate faces, and by use perhaps as an Awl or Rimer, or in scraping with the edges of the upper and lower faces alternately.

From Laugerie Basse.

Fig. 9. Simple flake of dark-grey, mottled, coarse flint. Edges slightly roughened by wear and tear.

From Laugerie Basse.

Fig. 10. Simple flake (with "bulb of percussion" on the face not figured) of white (burnt?) flint, with some stalagmitic adhesion, and stained yellowish outside. Untouched by use.

From Les Eyzies.

Fig. 11. A fine simple flake of mottled fossiliferous flint, carefully shaped into a leaf-like or lanceolate form by dressing here and there on the edges.

From Les Eyzies.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	37	1·457	12	0·472	6	0·236
2.	31	1·220	18	0·709	3	0·118
3.	42	1·654	26	1·024	8	0·315
4.	39	1·535	12	0·472	5	0·197
5.	62	2·441	15	0·591	5	0·197
6.	79	3·110	13	0·512	6	0·236
7*.	125?	4·921?	40	1·575	10	0·394
8.	61	2·402	14	0·551	5	0·197
9.	55	2·165	14	0·551	4	0·157
10.	93	3·661	40	1·575	11	0·433
11.	113	4·449	50	1·969	13	0·512

* The specimen has lost about a sixth of its length.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XXXII.

Louveau del. et lith.

Imp. Becquet à Paris.

A. PLATE XXXII.

In the flint Implements here figured we have an assortment of markedly different types from four or five Stations; but, excepting figs. 6 and 10, they are such as have been already figured. The former is a delicate flake, one edge of which has been worn down with scraping wood or bone; and numbers of these little side-scrapers occur at the Laugeries and at La Madelaine. The latter is a short strong knife, with narrow haft. Figure 7 may be noticed as representing an extreme stage of the laborious chipping of the Laugerie Haute Station.

Fig. 1. A short oblong Scraper or "Thumb-flint," mottled grey; rounded at one end, and obliquely truncate at the other. Compare A. Plate X. figs. 5 and 6, A. Plate XX. fig. 6, A. Plate XXIV., &c.
From the Gorge d'Enfer.

Fig. 2. Piece of an arched flake of dark spicular flint; pointed at the ends (more perfectly at one end than the other) by bold lateral fractures. No marks of wear. See also fig. 5, A. Plate VIII., described at page 28.
From —— ?

Fig. 3. A somewhat pentagonal, irregular-shaped Scraper; of the same mottled grey flint as that of fig. 1. This specimen much resembles that seen in fig. 8, A. Plate VII., page 24.
From the Gorge d'Enfer.

Fig. 4. A narrow-lanceolate Weapon-head of brownish flint, weathered grey; made out of a simple flake by careful chipping at the point, along the convex edge, and at the butt.
From the Gorge d'Enfer.

Fig. 5. A fragment of a well-wrought, thin, lanceolate implement of opaque, yellowish-white, granular flint, weathered or burnt (?). The large notches on the edges are of recent origin. For other specimens of this type of workmanship see A. Plates IV. and VI.
From Laugerie Haute.

Fig. 6. A small narrow flake, light-brown and translucent, which has been used on one side as a Scraper. These small side-scrapers, very common at the Laugeries and La Madelaine, were probably set lengthwise and edgewise in a

piece of wood or bone to strengthen their back, and give a handle to the workman, as in a small Spokeshave. Compare figures 9 and 10, in A. Plate II.

From Laugerie Basse.

Fig. 7. A fragment of a well-worked implement of whitish, opaque, granular flint. The edges of this portion (probably from near the point of the weapon) are deeply and broadly notched with careful chipping. See also fig. 5.

From Laugerie Haute.

Fig. 8. An imperfect spatulate Scraper* of yellow flint, similar to such as have been already described and figured (page 25, A. Plate VII. fig. 13; and pages 83 and 84, A. Plate XIX. figs. 4–7).

From the Gorge d'Enfer.

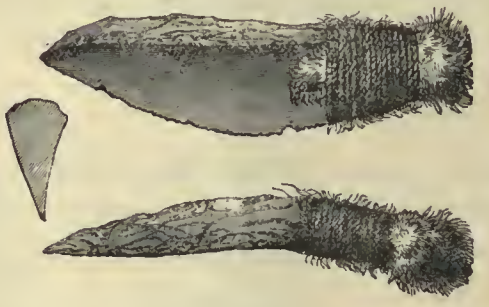
Fig. 9. An irregularly ovate implement (perhaps a rough Javelin-head), boldly chipped on both faces, and bearing a continuous and flexuous cutting edge all round, which, however, is less trenchant at the narrow end or butt. Weathered white. This implement is ruder and smaller than that shown in A. Plate XXI. fig. 5 (from Laugerie Haute, p. 106), but exhibits the same style of workmanship.

From Badegoule.

Fig. 10. A dressed piece of flint flake, light-brown within, whitened externally by weathering, and retaining some of the cave-earth here and there on its surface. It is a kind of Knife. One of the edges of the flake has been broken away along an

Fig. 24.

Stone Knife, hafted with fur and cord. From Australia. (Half natural size.)



irregular line; and this rough edge constitutes the back of the Knife; the other edge, trimmed round towards the point (downwards in the figure), is the blade.

From Badegoule.

* The dotted lines in the figure are doubtless too long for the rapid curve of the perfect instrument.

In the Christy Collection is an analogous implement made out of a thick flake of lydite by the Australian aborigines, and furnished with a handle of Kangaroo fur, lashed on the narrow butt with native string.

The Australian implement here referred to has been described and figured by Mr. John Evans, F.R.S., in his 'Ancient Stone Implements, Weapons, and Ornaments of Great Britain' (8vo, 1872), p. 264, fig. 198; and to him we are indebted for the use of the wood block (fig. 24) in this place.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	53	2·087	30	1·181	7	0·276
2.	53	2·087	27	1·063	10	0·394
3.	42	1·654	35	1·378	9	0·354
4.	116	4·567	26	1·024	9	0·354
5*.	45?	1·772?	23?	0·906?	5?	0·197?
6.	55	2·165	6	0·236	2	0·079
7*.	30?	1·181?	15?	0·591?	6?	0·236?
8†.	110?	4·331?	35	1·378	11	0·433
9.	53	2·087	25	0·984	10	0·394
10.	68	2·677	21	0·827	6	0·236

* These are fragments. † This has lost perhaps half an inch of its rounded end.

Fig. 25. (See page 136; and figs. 4 & 6 in A. Plate XXIII.)

Portion of a Flint Tool with semicircular edge. Dordogne.

A. PLATE XXXIII.

In this Plate we have figures of some very interesting specimens of stone work. 1. A neat and symmetrical Lance-head (unfortunately broken), dressed on both faces, and rather more oval than those of Laugerie. 2. A sharp-pointed Lance-head (?) or tool, chipped out of a triangular flake. 3. Two pieces of the peculiar Scrapers or Knives (figs. 4 & 6), of semilunar outline, strongly convex on one edge and slightly incurved on the other, such as are common in Denmark, but rare elsewhere. Another specimen, met with in a cave in the Dordogne district, imperfect, and differing from the others by its straighter edge not being incurved, has been presented to the Christy Collection by Mr. John Evans, F.R.S., and is shown in the woodcut (fig. 25, p. 135). This is of greyish-brown, granular, sub-translucent flint, partially weathered with bluish-white mottling, and retaining a whitey-brown patch of the original crust. 4. A piece of stout flake dressed as a Saw or a Comb (for wool, hair, or fibre), and well fitting to the hand.

Fig. 1. A portion of a carefully dressed, acute-oval Implement or Lance-head of mottled cream-coloured flint, of the same type as those figured in A. Plate IV., but not quite so pointed.
From the Gorge d'Enfer.

Fig. 2. A simple triangular flake of dark-grey, mottled, sponge-bearing flint. Edges minutely jagged, probably by accidental wear and tear. Surface bearing small patches of stalagmitic concretion.
From Le Moustier.

Fig. 3. Irregularly triangular, or shoulder-of-mutton-shaped Implement of dark-grey flint*, narrowed towards the point, and sharpened by careful chipping on one face.
From Le Moustier.

Fig. 4. Moiety of a semilunar or sickle-like, neatly dressed, flat Implement of brownish-grey flint, carefully chipped on one face. It is mottled grey by weathering: and the fracture is old; for its face is equally weathered with the rest of the surface. In the drawing of this imperfect Implement the outline of

* Remarks on such Implements, fashioned from rough triangular flakes, are made at page 119.

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(DORDOGNE.)

A. PL. XXXIII.

Louveau del. et lith.

Imp. Becquet à Paris.

the whole is given, hypothetically, as corresponding with the shape of the crescentic flint Implements of enigmatical use, of which notices are given in Worsaae's 'Nordiske Oldsager i det Kongelige Museum i Kjöbenhavn' (8vo, Copenhagen, 1859), p. 15; in Morlot's 'L'Archéologie du Mecklenbourg,' p. 27; in Lubbock's 'Prehistoric Times,' 1865, p. 74; and in Mr. E. T. Stevens's 'Flint Chips: a Guide to Prehistoric Archæology' &c. (8vo, London, 1870), pp. 74, 75.

From Laugerie Haute.

Fig. 5. A portion of a coarse, thick, straight flake of grey flint, the thinnest edge of which has been, apparently with intention, jagged with six nearly regular notches. Were it not for the thickness of the edge (broadly wedge-shape in section) it would probably serve as a Saw; but it is much better adapted as a comb for tearing flax or other fibrous substances.

From Le Moustier.

Fig. 6. A moiety of another curved flat Implement, but tapering more delicately than fig. 4, and with less boldly jagged edges. It is of dull amber-coloured flint, and retains some of the ochreous crust of the original nodule.

From Le Moustier.

Figure.	Length		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	72	2·835	42	1·654	5	0·197
2.	80	3·150	48	1·890	7	0·276
3.	70	2·756	47	1·850	5	0·197
4*.	[55]	[2·165]	[38]	[1·496]	[5]	[0·197]
5.	72	2·835	30	1·181	8	0·315
6*.	[84]	[3·307]	[36]	[1·417]	[5]	[0·197]

* These are fragments.

A. PLATE XXXIV.

A series of the common round-ended Scraper-like Implements, or simple flakes more or less dressed and rounded at one or both ends, are here figured. They are from several Stations. In some instances signs of their side-edges having been used in scraping are evident enough, as we have noticed in other instances (pages 23 &c.). More or less oblong Scrapers of similar and allied types are figured in A. Plates VII., X., XIX., XX., and XXIV., also here and there among the figures in other plates, and in the woodcut (fig. 3*a*, *b*, *c*) at page 22.

The applicability, and indeed actual use, of the round-ended flakes, called "Scrapers," "Thumb-flints," and "Finger-flints," for striking a light with a piece of *iron-pyrites**, has been clearly illustrated of late by Mr. John Evans, F.R.S., and the Rev. Canon Greenwell (see Evans's 'Ancient Stone Implements of Great Britain,' 1872, pages 284 & 285).

Fig. 1. A neat brownish specimen of the common round-ended Implement or "Thumb-flint." Each of the lateral edges has been worn down to a nearly straight line; and one of them (on the left hand in the figure) has been worn away to some little distance within the original curve of the rounded end. A smoothing of the minute jags of the worn edges is perhaps referable to a secondary use of the edges; and just such an edge is produced in a flint flake by scraping a bone with it, and afterwards using it for detaching gristle and sinew, or for shaping a piece of wood.

From Laugerie Basse.

Fig. 2. A broad, flat, round-ended Scraper of grey granular fossiliferous flint.

From Les Eyzies.

Fig. 3. A roughly shaped Scraper-like Implement of dark-grey mottled flint, with small patches of stalagmitic cement still attached.

From Le Moustier.

This specimen seems to be particularly well adapted for "striking a light,"

* We are informed by Mr. A. Madgett that he has himself seen *two flints* used to light a fire at Thrandestone, Suffolk, and that the practice was not at all uncommon in Suffolk and Norfolk within the last fifty years. He says that "they were certainly two flints, very dark, with sharp edges. The 'tinder' used was very dry moss, laid on the ground; and the flints were struck together very quickly, just above it."

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(DORDOGNE.)

A. PL. XXXIV.

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the above mentioned stone (fig. 10) or a piece of pyrites. Further, the truncated end of fig. 7 coincides with this action, as also do the squared end of fig. 4 (of the same Plate) and the oblique end of fig. 6.

Other specimens, such as fig. 7, A. Plate VII., and fig. 3 of A. Plate XII., may be selected as having probably been used for striking fire,—a necessity which the Reindeer-hunters must have felt and overcome whenever they resorted to the Caverns for cooking their food. The implements for this and other practices and employments seem to have been made on the spot, often in considerable numbers, and left there when they had served the occasion, either not cared for, or superstitiously thrown aside as not to be used elsewhere or a second time.

Fig. 4. A neat Scraper, made from a simple flat flake of translucent, granular, brown Flint, the truncated end being chipped round. This end has possibly been used; and the side-edges have been partially worn by use.
From La Madelaine.

Fig. 5. A narrow, arched, amber-coloured flake, roughly truncate at the bulb-end (lowest in the figure), and dressed round at the other extremity. Edges not worn.
From Laugerie Basse.

Fig. 6. A symmetrical, boldly dressed Scraper, much narrower at one end than the other. Grey and brown banded flint.
From Laugerie Haute.

Fig. 7. A narrow, somewhat arched, yellow-banded flake, neatly rounded at the ends. Edges unworn. Patches of hearth-stuff still attached.
From Les Eyzies.

Fig. 8. A simple, arched, shiny flake of dark-coloured flint, with the bulb-end neatly dressed to an elliptical outline; the other end rounded, and perhaps used.
From Laugerie Basse.

Fig. 9. A simple, slightly arched flake, rounded at one end as usual. Externally opaque and discoloured (dirty yellow) by weathering. The totally unworn state of the edges is in strong contrast with the condition of the edges in fig. 1.
From Les Eyzies.

Fig. 10. A narrow, slightly arched, simple Grattoir, of drab opaque flint. Edges not used.
From Les Eyzies.

Fig. 11. An irregularly elliptical arched Grattoir, dressed symmetrically at the broader end, and less carefully at the other. A portion of one edge (low down on the left-hand side in the figure) near the rounded extremity seems to have been worn away.

From Le Moustier.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	72	2·835	20	0·787	6	0·236
2.	72	2·835	29	1·142	7	0·276
3.	79	3·110	40	1·575	15	0·591
4.	84	3·307	27	1·063	6	0·236
5.	76	2·992	14	0·551	6	0·236
6.	96	3·780	33	1·299	16	0·630
7.	87	3·425	20	0·787	8	0·315
8.	123	4·843	24	0·945	8	0·315
9.	105	4·134	28	1·102	7	0·276
10.	95	3·740	19	0·748	8	0·315
11.	86	3·386	30	1·181	10	0·394

B. BONE IMPLEMENTS, &c.

B. PLATE XIX. & XX. (Double.)

This double Plate comprises careful figures of some of the choicest specimens of prehistoric art, and the most valuable (as indicative of primæval taste and habits) that the Caves of Aquitaine have yielded. They are all from the rock-shelter of Laugerie Basse. The carvings of Horse and Reindeer, the sketches of Ibex and two Bovine forms, both broadly and specially indicate the habits and surroundings of the Cave-folk; whilst the adaptation of the well-cut figures to the conditions of the material, and even to the shape of a handle, bespeaks high intelligence, thought, and talent.

These specimens have already been treated of by Messrs. Lartet and Christy, and partially illustrated, in their Memoirs, (1) "On engraved and carved Objects of Prehistoric Date in Western Europe"* ('Revue Archéologique,' nouvelle série, 5e Année, Avril 1864), and (2) "New observations on the Existence of Man in Central France at a time when the country was inhabited by the Reindeer and other animals not living there now"† ('Compt. Rendus de l'Acad. des Sciences,' vol. lviii. pp. 401 &c., and 'Annales des Sciences Naturelles,' 5me série, Zoologie, vol. i. pp. 232 &c., 1864).

Fig. 1. This is a long, slightly curved Harpoon-head (?), carved out of Antler, broken at one end, and furnished with a lancet-shaped point (imperfect) and a single barb at the other. Below the barb the stem is carved, in low relief, so as to represent a Horse's head; the face (2 inches long), on the same edge with the barb, is surmounted with a pair of rather long, pointed, parallel ears ($\frac{3}{4}$ inch long), towards the barb; and the eyes, nostrils, lips, and hairy jowl are given on either side of the stem. Beyond the Horse's face, on one side of the stem, is an elongated figure of a Deer, in low relief, imperfectly carved, the hind quarters not being defined. The head and neck are carefully executed; the left fore leg roughly indicated: the left-hand Antler (apparently that of a

* "Cavernes du Périgord: Objets gravés et sculptés des temps préhistoriques dans l'Europe occidentale."

† "Note sur de nouvelles observations relatives à l'existence de l'homme dans le centre de la France à une époque où cette contrée était habitée par le renne et d'autres animaux qui n'y vivent pas de nos jours."

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(DORDOGNE.)

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Reindeer) is carried over the edge; and with a stem $\frac{1}{4}$ inch long, furnished with a short brow-tyne, it stretches backwards ($1\frac{3}{4}$ inch) until lost in indistinct longitudinal cuttings. An irregular wavy line along the flank reminds us of the longitudinal chevrons in B. Plate II. fig. 2, and may perhaps refer to a shaggy coat of hair.

A roughly attempted delineation of a short tail, hind quarters, and belly-line appears on the opposite side of the stem; but here the intended head seems to have been sacrificed to the antler brought over from the other side. On this side also, a series of interrupted linear gashes, and some less distinct scorings, serve for ornament along the remainder of the surface.

On the other side, a faintly cut outline of a Fish ornaments the space between the Deer's nose and the broken end of the stem.

From Laugerie Basse.

In the 'Annales des Sciences Naturelles,' 1864, 5me sér., Zoologie, vol. i. p. 237, this specimen is thus referred to by MM. Lartet and Christy in their memoir "On the Existence of Man in Prehistoric Times:"—

"Among the carved specimens found at Laugerie Basse is a rounded stem or shaft, made out of the beam of Reindeer Antler, and having a lance-point with a lateral barb. Was it a tool, a weapon, or a sign of authority? We cannot tell. Just below the barb there is a Horse's head carved, in low relief, on three sides of the stem, with the ears lying out flat, rather long for a Horse, but not long enough for an Ass. Beyond this head is another with a slender muzzle, and with branching antlers. The brow-antler projects forward, whilst the beam and palm are turned backwards along the stem. The slenderness of head and muzzle, the dilated form of the brow-antler, and the general physiognomy are referable to the Reindeer rather than the Stag.

"In front of the head of this creature the stem bears a slightly scratched outline, which we may regard as that of a Fish."

This specimen is also described (with rough illustrations) by MM. Lartet and Christy in their paper "On the Caverns of Périgord," reprinted from the 'Revue Archéologique,' 1864, at p. 30, pl. 2. fig. 10. Here the dilatation of the brow-antler is especially referred to as a distinctive Reindeer feature.

Fig. 2. This is a large portion of the palm of a Reindeer's brow-antler, bearing a nearly entire engraved outline of a horned animal like an Ibex* (Wild Goat or Bouquetin). The horns point upwards with a slight backward curve. At a

* See 'Cavernes du Périgord,' *loc. suprà cit.* p. 29; and 'Ann. Sc. Nat.,' *loc. cit.* p. 237.

little distance behind the horns is an indication of deep-set, sharp, longish ears, pointing somewhat backward. Below the chin appears a tuft of hair, or beard. By these features the figure is referable to an Ibex, although the rather full forehead and the swollen crest behind the ears are somewhat opposed to this conclusion. The smallness of the horns indicates probably a young or female

Fig. 28. (See also B. Plate XIX. & XX. fig. 2.)

individual. The Woodcut, fig. 28, gives the shape of the muzzle better than the lithograph.

The ancient artist has curiously figured both hind legs of the animal as turned, at the hocks, abruptly forwards and upwards, so that the hoofs (distinctly cloven) touch the belly, although there was sufficient space on the piece of horn for these limbs to have been given in their natural position.

Whether the hind legs were distorted merely by bad drawing, or at the engraver's caprice, or from his recollection of a ham-strung or otherwise wounded beast—or, having begun with a sketch of a recumbent animal, he finished it otherwise—or, meaning to indicate an animal scratching itself, he put both legs inadvertently in one position, it seems impossible to determine.

The figure is deficient of tail and croup by fracture; and the fore legs, standing well posed, are truncated above the fetlock at the natural edge of the antler-palm; and they are transversely scored by accidental slips of the graving tool.

There is no drawing on the other side of the specimen.

From Laugerie Basse.

Fig. 3. On a broad palm of a Reindeer's brow-antler, unfortunately much broken, we have here a bold and characteristic outline of a Bovine animal*, judging

* See 'Annales Sc. Nat.,' *loc. suprà cit.* pp. 236, 237.

from the form of hock, fetlock, and hoof. The outline of the croup, the setting-on of the tail, and what remains of the nearly horizontal dorsal line, together with the heavy dewlap, reaching far down between the legs*, have reference to a true *Bos* (possibly *Bos primigenius*). The legs of the right side only are drawn. The withers and horn (right-hand side) are lost with the wanting pieces of the specimen.

The old artist, in utilizing the angular shape of this antler-palm, has given the animal a constrained position, spoiling the effect of his drawing, and especially interfering with the natural position of the head. This is thrown upwards and backwards to allow of the probably short and slightly curved profile of the terete-pointed horn being included within the natural margin of the palm, and between that edge and the neck of the Bull. The head, too, has a somewhat indefinite outline, owing to the upward continuation of the throat-line, parallel to a short line starting from underneath the chin. Without these unfinished lines below the muzzle (which, however, together with the short parallel lines of hatching on the chest and dewlap, might possibly have been intended for shaggy hair), the short subtriangular outline would have some resemblance to the profile of a Chillingham Bull's head, as figured in Messrs. Mennell & Perkins's "Catalogue of the Mammalia of Northumberland and Durham," in the 'Transactions of the Tyneside Naturalists' Field-Club,' vol. vi. 1864, p. 145, fig. 3.

On the back of this specimen two imperfect outlines of apparently bovine animals are rudely sketched. The hind quarters of the one interfere with the fore limbs and carcass of the other; and both are mutilated by the imperfection of the broken antler-palm. See fig. 29, page 146.

From Laugerie Basse.

Fig. 4. This is a Reindeer's brow-antler-palm, broken by an old fracture, and bearing a bold sketch, made by no uncertain hand, of the hind quarters and barrel of a large Bovine animal†, as the smallness of the tail, straightness of the hocks, advanced position of the male organ, and sudden rise at the withers clearly indicate. The last-mentioned feature is characteristic of the Aurochs; but unfortunately the fracture interrupts the outline just where the villose mane, or long shaggy hair of the neck, characteristic of the species of the subgenus *Bison*, ought to commence. There is no drawing on the other side.

From Laugerie Basse.

* "Crook-knee'd and dewlap'd like Thessalian Bulls."—SHAKESPEARE.

† See 'Cavernes du Périgord,' *suprà cit.* p. 28; and 'Annales Sc. Nat.,' *loc. cit.* p. 236.

Fig. 29.

Outlines of Bovine Animals engraved on the back of the specimen figured in B. Plate XIX. & XX. fig. 3.

Fig. 5. This most interesting of the carvings from Laugerie Basse is a Poniard, cut out of the beam of a Reindeer's horn—the handle being shaped as a Reindeer* out of the lower portion, and the rest of the beam reduced, chiefly by longitudinal sawings, to a tapering blade, rough, and irregularly subtriangular in section.

The workman, or artist as he deserves to be called, has here shown considerable cleverness in adapting the animal form, without unnecessary violence, to the mode of handling usual with such a weapon as we have before us. The hind legs are stretched out towards the blade; but they are not carved in detail. The front legs, with disproportionately short forearm, are bent without effort under the stomach; and the long shanks form part of the slightly concave lower edge of the handle. The head, bearing branched antlers, has its muzzle so raised that the horns rest smoothly on the sides of the shoulders, so as not to interfere with the use of the handle by a very small hand (smaller than ordinary in the existing races of Central Europe), with the palm fitting into the concavity formed by the neck, back, and croup of the animal.

The attitude given to the head did not allow of the projecting brow-tynes being expressed; these are wanting, therefore, as a specific feature; nevertheless the short ears and thick neck are characters pointing to the Reindeer. Moreover the artist has left a thin ragged protuberance underneath the neck, which aptly resembles the tuft of hair commonly met with at this spot in the male Reindeer and never present in the Red Deer.

Perhaps this Poniard was never quite completed by the native artist, who seems to have been capable of giving greater finish to his work, had he been so minded. It is far more perfect, however, at all events in the handle, than the Poniard figured in B. Plates III. & IV., with which it may be compared for the relation of the parts of the carved animal to the burr and tynes left untouched in the other implement, the croup of the carved Deer corresponding with the root of the bez-antler.

From Laugerie Basse.

The handles of three similar poniards have been discovered by M. Peccadeau de l'Isle at the Montastrue cave, near Bruniquel, on the left bank of the Aveyron, Dordogne. Two of them, representing the Reindeer, are carved in Mammoth-ivory; the third, in form of the Mammoth, is in Reindeer-horn. These are figured in the 'Revue Archéologique,' vol. xvii. (1868), p. 218, and in the 'Matériaux pour l'Histoire primitive et philosophique de l'Homme,' vol. iv. (1868), pp. 96, 97.

* See 'Cavernes du Périgord,' *suprà cit.* p. 31.

B. PLATE XXI.

This Plate exhibits a limited assortment of carved Implements, formed out of Reindeer-antlers, from Laugerie and La Madelaine.

Figures 1 and 5 have their analogues in B. Plates IX. and X.

Fig. 1. The butt of a cylindrical tapering Harpoon-head, wedge-shaped at the end, with chevron scorings on its sloping face, probably to make it fit the tighter on the haft. A badly drawn outline of some Herbivore, with a long, heavy, somewhat Elk-like muzzle (probably a very badly drawn Horse), ornaments the remaining portion of this broken stem.

From Laugerie?

Fig. 2. A piece of a shaft or stem of some implement or weapon, broken at one end, tapering at the other, with a damaged point. It has been neatly smoothed and ornamented, on one face with a row of small, raised, equidistant rhombs, on a straight ribband-like band, bordered by some narrow, longitudinal, parallel furrows. A similar ornament occurs in B. Plate III. & IV. fig. 3; and modified in B. Plate XVIII. figs. 1 and 4. The other side of the specimen is flat, and shows the cancellous interior of the bone (antler).

From Laugerie.

Fig. 3. A curved stick-like Implement, broken at one end; smooth, slightly tapering, and rounded at the other, which is narrow-tongue-shaped, and adapted for rubbing and smoothing seams in skin and other material.

The concave face and the sides are ornamented with longitudinal grooves (figs. 3*a*, 3*b*). The straight portion of the convex face is hollowed out; and the edges are scored with little oblique notches, eleven on one side, and thirteen on the other (fig. 3*c*), nearly opposite to each other, but not regular, nor offering any patent explanation of their origin and use (if really made for a purpose), except possibly as tally-marks of work done or things counted.

From Laugerie.

Fig. 4. This is the sharp end of an Harpoon or Lance. It was either left unfinished—the oblique incisions (eight on one edge of the fragment and three on the other, on both faces) being merely the outlines of intended barbs, never

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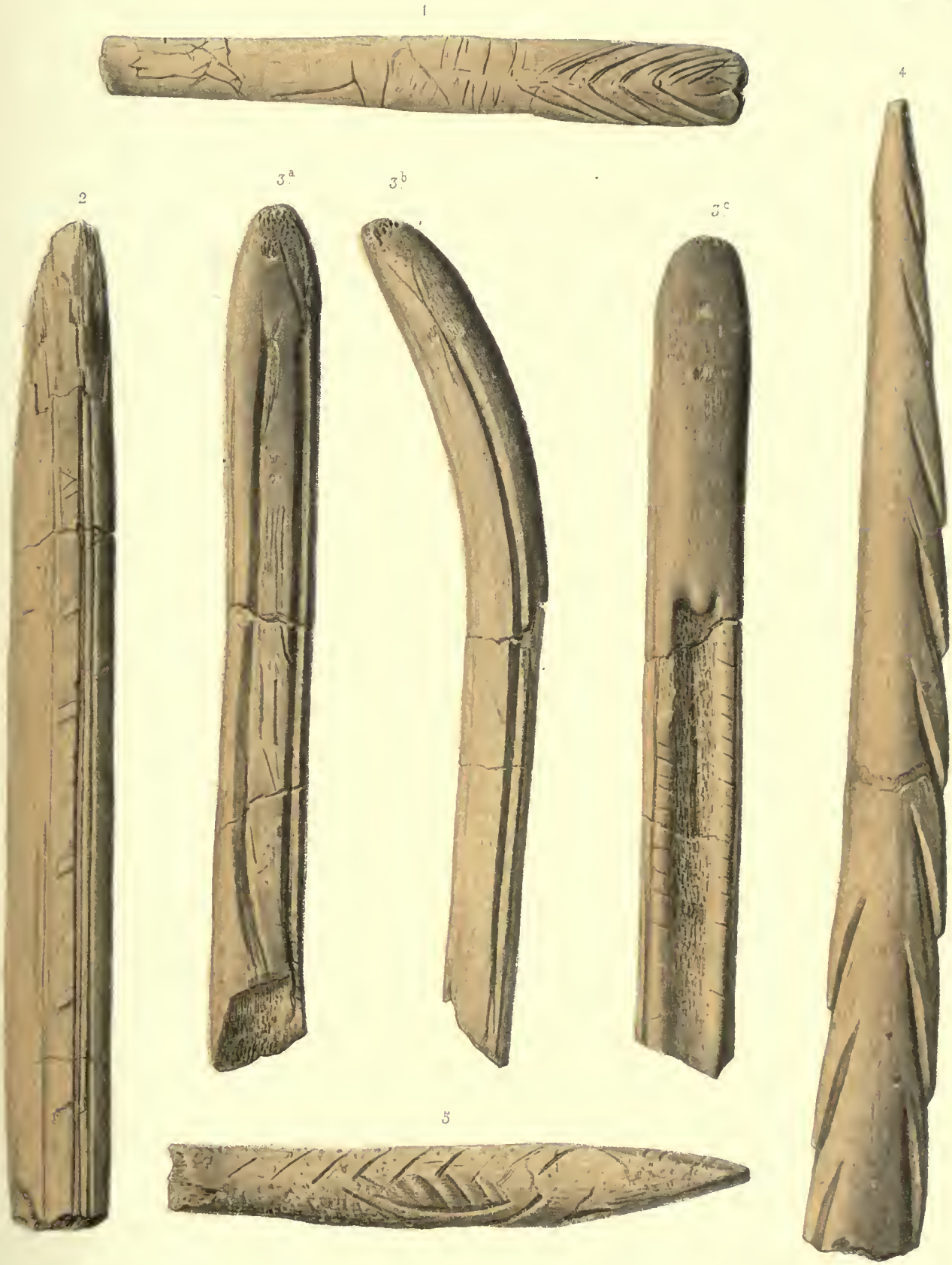
(DORDOGNE.)

B. PL. XXI.



Louveau del. et lith.

Imp Becquet à Paris

B. PLATE XXII.

We here figure a group of the barbed and grooved Harpoon-heads, bulbed at the butt, such as have been found in the rock-shelter of La Madelaine in large numbers and with endless modification of pattern. A few have been met with at Laugerie Basse. They have been carved out of Reindeer-horn. Some have evidently been repointed (figs. 1, 2, 3, 4, and 6), and, as usual, with a wedge-shaped or bevelled point. All have grooves along each barb; and most have grooves also at the base of each barb, short or long, and either parallel with the stem or obliquely across the root of the barb.

Observations on this kind of Implement, ancient and modern, are given at pages 9, 49, and 100, with the descriptions of the specimens illustrated by B. Plates I., VI., and XIV.

Fig. 1. Slender, with the usual conical butt and lateral bulbs; it retains six grooved barbs; but it had more; for the remains of three others have been left in repointing the head. The grooves at the base of each barb are angular, and thus enclose it with a lozenge-shaped incision.

Fig. 2. A large specimen, broken at the apex, apparently after repointing; seven grooved barbs remain. The grooves on the stem are short, and straight across the roots of the barbs.

Fig. 3. Stout, with only four barbs: it has been reduced in length by fracture and repointing. The grooves on the barbs are each continued straight along the stem to the next barb above.

Fig. 4. Rather slender, with only a pair of barbs perfect; the others are broken; a long interval occurs on one side without a barb. The top has been repointed. The barbs are grooved; but the stem is not distinctly grooved; perhaps it was pared down when repointed.

Fig. 5. The sharp end of a slender, many-barbed Harpoon. Eleven grooved barbs belong to the fragment, which retains the original tapering, terete, or nearly cylindrical point. Short vertical grooves occur between the barbs.

Fig. 6. A portion of a slender specimen; the butt is gone; the apex has been repointed; seven grooved barbs remain, with oblique notches at their roots.

Fig. 7. Part of a many-barbed Harpoon; the extreme point is lost: eleven close-set grooved barbs remain on the fragment; and oblique grooves cross their bases.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XXII.

Louveau del. et lith.

Imp Becquet à Paris

Louveau del. et lith.

Imp. Becquet à Paris

A. STONE IMPLEMENTS.

A. PLATE XXXV.

Five specimens from the Gorge d'Enfer, comprising two pieces of large spatulate Scrapers (figs. 1 and 2), one long simple Scraper (fig. 3), one handsome Scraper with both ends rounded (fig. 4), and one simple flake (fig. 5).

Fig. 1. A portion of such a long spatulate Scraper as that drawn in A. Plate XIX. fig. 5, and described at page 84, but larger. The edge has been bevelled by chipping; but it is probable that this flat specimen was one of several flakes successively struck off an already dressed block, such angular specimens as those described at page 118 (but not curved, as they are) being first removed from the prepared block; and therefore the dressing of the edges may be due to the dressing of the block. It is mottled grey.
From the Gorge d'Enfer.

Fig. 2. A portion of another long spatulate Implement, slightly arched, and with dressed edges. It has been tapered by chipping to a point at the thin end. Opaque and yellow.
From the Gorge d'Enfer.

Fig. 3. A narrow, high-ridged, slightly arched, drab-coloured flake, broken at one end, rounded at the other.
From the Gorge d'Enfer.

Fig. 4. A neat Implement, of banded drab and yellow flint. It is a stout flake, carefully trimmed at the ends, worn along one of the side edges, and indented on that border with a semicircular notch, by scraping the narrow rounded surface of probably a rod or stem, whether of wood or bone.
From the Gorge d'Enfer.

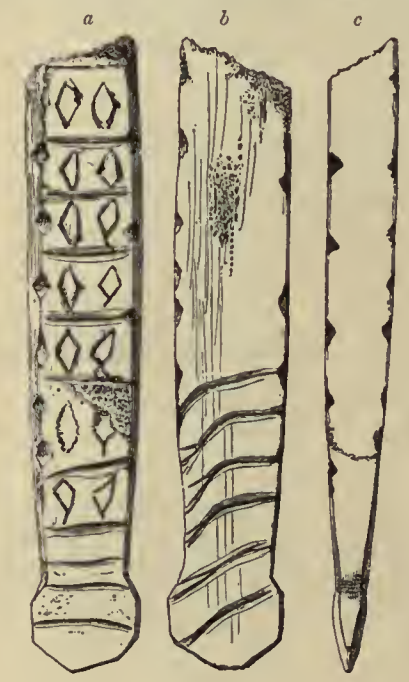
Fig. 5. A simple flake of dark-coloured subtranslucent flint.
From the Gorge d'Enfer.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1*.	[100]	[3·937]	[30]	[1·181]	[5]	[0·197]
2*.	[132]	[5·197]	[42]	[1·654]	[9]	[0·354]
3.	124	4·882	22	0·866	8	0·315
4.	159	6·260	30	1·181	13	0·512
5.	125	4·921	20	0·787	6	0·236

* These are fragments.

Fig. 30.

A portion of a Tally-stick or Gambling Tool (?) of Reindeer-antler, from La Madelaine, on the Vézère.



RELIQUIÆ AQUITANICÆ.

(*DORDOGNE.*)

A. PL. XXXVI.

Louveau del. et lith

Imp. Becquet à Paris.

A. PLATE XXXVI.

A series of flint flakes from the Gorge d'Enfer, four of which have been more or less dressed into symmetrical Implements for chiselling (figs. 1 and 3), or for Scraping (figs. 1, 3, and 4), or as a Spear-head (fig. 2). The others are simple flakes, one of which (fig. 5) has decidedly been used as an Implement ready to the hand of the Savage.

Fig. 1. A narrow, somewhat sigmoid, and arched Implement made from a flake of grey flint, by carefully tapering the ends and dressing the sides. One end (uppermost in the drawing), bluntly chisel-shaped, may have been used as a Chisel, and the side-edges for scraping.
From the Gorge d'Enfer.

Fig. 2. A broad, drab-mottled flake, truncate at one end, and once tapering in a lanceolate form at the other (upwards in the figure), but broken now. The side-edges, as well as the once pointed end, have been dressed into symmetry. Some stalagmitic adhesions remain on the flat face.
From the Gorge d'Enfer.

Fig. 3. A straight, mottled-grey flake, slightly but neatly dressed at the bulb-end (uppermost in the figure); and once, it seems, shaped into a chisel-like point* at the other; but a longitudinal fracture has taken off half of the point and some of the corresponding edge.
From the Gorge d'Enfer.

Fig. 4. A slightly arched flake, opaque and drab, neatly dressed into symmetry, with one narrow and one broadly rounded end; the latter damaged.
From the Gorge d'Enfer.

Fig. 5. A simple flake of grey- and drab-banded flint, untouched on the straight edge, except at the tip; but worn by use on the upper half of the naturally jagged edge.
From the Gorge d'Enfer.

* Not well drawn in the figure.

Fig. 6. A simple flake of dark-grey transversely banded flint: one edge is jagged, probably by accidental breakage.
From the Gorge d'Enfer.

Fig. 7. Another undressed flake, mottled grey.
From the Gorge d'Enfer.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	107	4·213	23	0·906	10	0·394
2*.	[111]	[4·370]	35	1·378	12	0·472
3.	112	4·410	24	0·945	10	0·394
4.	94	3·701	18	0·708	8	0·315
5.	105	4·134	20	0·787	7	0·276
6.	107	4·213	25	0·984	6	0·236
7.	90	3·543	26	1·024	6	0·236

* A broken specimen. Its point was lower by probably $\frac{3}{4}$ inch or more.

Louveau del. et lith.

Imp. Becquet à Paris

A. PLATE XXXVII.

Three simple unused flakes, the waste in dressing blocks, and three large coarse flakes dressed as Scrapers or Strikers, of different shapes, are here represented.

Fig. 1. A simple rough flake of brownish-grey, granular, subtranslucent flint. It retains a small patch of stalagmite.
From Le Moustier.

Fig. 2. A simple flake of dark subtranslucent flint.
From Le Moustier.

Fig. 3. A simple rough flake of dark-grey flint.
From Laugerie Haute?

Fig. 4. A thick triangular flake of dark-grey flint, trimmed on the edges towards the apex. One edge is straighter than the other. The thick butt retains some of the original crust of the flint. Serviceable as a Spear-head, Axe, or other weapon or tool, especially as a strong Scraper for coarse wood-work.
From Le Moustier.

Fig. 5. A rough flake from the outside of a somewhat waterworn flint-nodule, which has been reduced on the back (the surface figured), and carefully trimmed to a circular outline for more than half its circumference (the right-hand and lower part of the figure), the bulb portion (on the reverse of the left-hand side) and a neighbouring projecting point being left to form a nearly straight rough edge, for holding in the hand, or for hafting; whilst the neatly rounded edge would serve as a broad Scraper or Chopper.

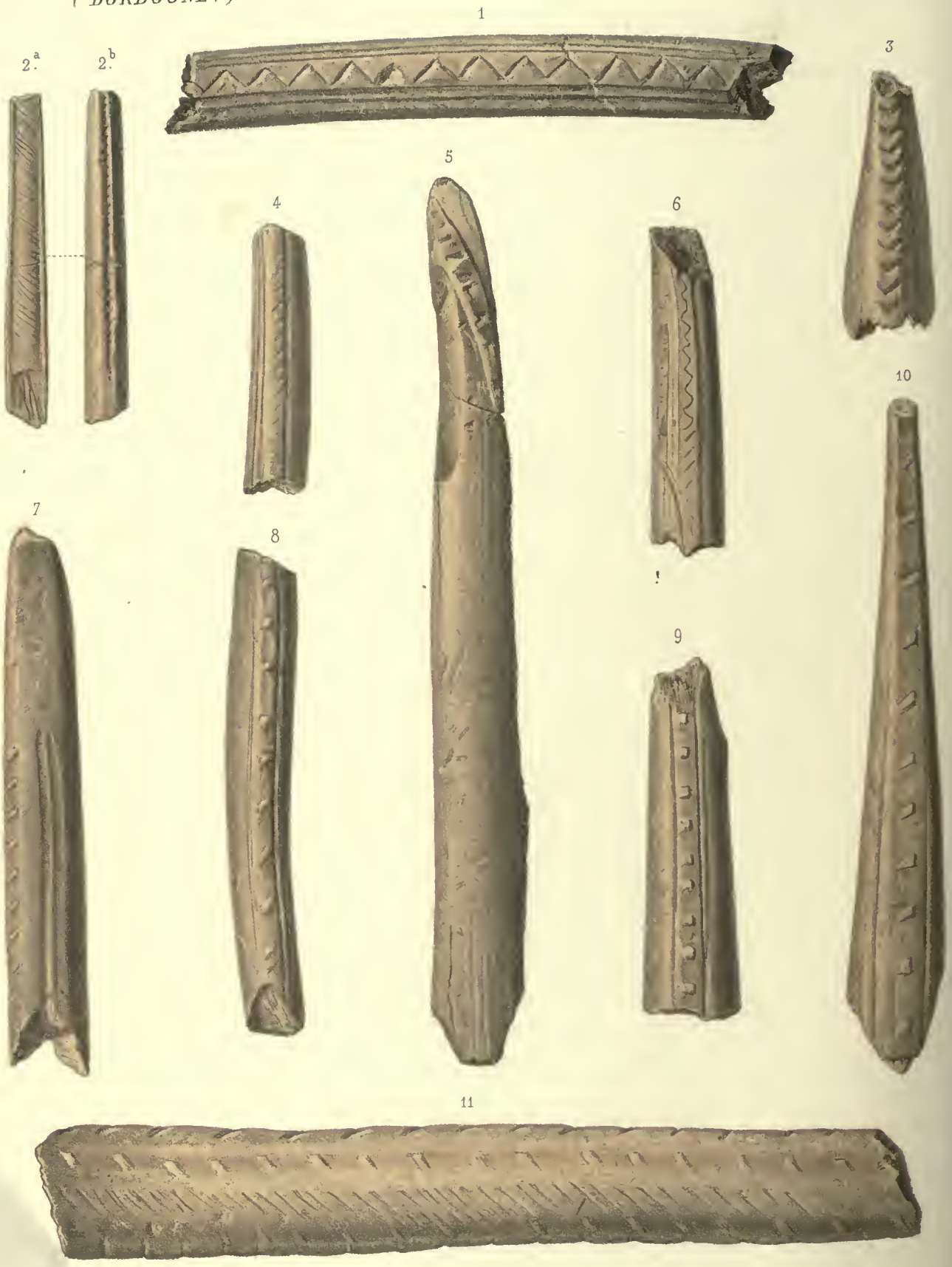
It is of brownish subtranslucent flint, mottled grey by weathering. Imbedded in the remaining portion of original crust lies the cast of a small *Cyphosoma* (Turban Sea-urchin), not well rendered by the artist.
From Les Eyzies.

Fig. 6. A thick flake of greyish flint (the bulb is on the reverse of the upper end of the figure), mottled by weathering, and retaining some of the opaque whitish crust along the thick edge. This constitutes the back of the implement; whilst

the thin edge has been trimmed to an elliptically convex cutting or scraping edge, which has been somewhat used.

From Le Moustier.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	108	4·252	46	1·811	11	0·433
2.	64	2·520	35	1·378	10	0·394
3.	95	3·740	42	1·654	7	0·276
4.	94	3·701	72	2·835	20	0·787
5.	85	3·347	73	2·874	15	0·591
6.	103	4·055	47	1·850	11	0·433



Louveau del. et lith.

Imp. Becquet à Paris.

B. BONE IMPLEMENTS, &c.

B. PLATE XXIII.

A selection of imperfect, ornamented, subcylindrical Implements or Weapons, mostly of antler, fig. 2 only being of bone. A raised fillet, variously sculptured, is the characteristic feature in most of them. Laugerie and La Madelaine are the chief sources of such specimens.

Fig. 1. A fragment, nearly round in section, ornamented on one side with two pairs of longitudinal grooves and a linear series of angles on a raised fillet between them. The other side is bare and rotted.
From Laugerie Basse.

Figs. 2*a*, *b*. A portion of a small bone Implement, fluted longitudinally on two faces; on one side (fig. 2*b*) the furrow is narrow; on the other (fig. 2*a*) it is as broad as the bone. The floor of each furrow is crossed with numerous, oblique, parallel, incised lines.
From Laugerie Basse.

Fig. 3. The edge of a conical fragment ornamented with a series of equal, deep-cut, close-set, chevrons on a raised fillet.
From ——?

Fig. 4. The edge of another fragment with parallel grooves and a series of oblique notches on the raised fillet between them.
From ——?

Fig. 5. An imperfect tapering Dart-head (?), with a raised, riband-like ornament, curving round towards its point. This scroll-like fillet is vaguely notched.
From ——?

Fig. 6. The edge of a fragment similar to fig. 4, cut into a raised riband-like border, with a wavy incised line, and some short, parallel, obliquely transverse notches, along its centre.
From ——?

Fig. 7. Another fragment of a tapering Dart-head, with a pair of close-set, parallel, narrow flutings and a series of small, raised, oblique rhombs. We have already seen this kind of ornament in fig. 3, B. Plate III. & IV.; figs. 1 and 4, B. Plate XVIII.; and fig. 2, B. Plate XXI.

From ——?

Fig. 8. A fragment, oval in section, with parallel lines enclosing a series of oblique raised rhombs, which thus form a scolloped fillet on one edge, the other being round and smooth.

From La Madelaine.

Fig. 9. Somewhat similar to fig. 8; but the raised spots on the fillet are square.

From ——?

Fig. 10. A sharply tapering Dart-point, ornamented on one side like fig. 8, with a series of oblique, raised, widely separate rhombs, becoming triangular below, on a broad fillet, between parallel incised lines.

From Laugerie.

Fig. 11. A fragment of a large curved subcylindrical Implement. The convex face is smoothed and carved; the opposite is rough, showing the cancellous interior of the antler. On one edge there are fourteen oblique notches; and on the other, nineteen transverse notches. Bordering each of these rows is a series of small rhombs in relief; and along the middle, between the two rows of rhombs, is a line of closely set oblique scorings, much finer than the lateral notches. The scoring is doubled at the centre for a short distance; and at one end its place is taken by a waved row of small fine notches.

From Laugerie.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

B. PL. XXIV.

Louveau del. et lith.

Imp. Becquet à Paris.

B. PLATE XXIV.

Fragments of various ornamented subcylindrical and other Implements, mostly of Antler, fig. 4 only being bone.

Fig. 1. A portion of a carved, rounded, and perforated Antler, of small size*. The ornament consists of the outlines of two animals in sequence, not well designed. The foremost (Antelope ?), standing with outstretched limbs, is spotted on the body and neck with scattered pitting, and has a small, sharp, nearly featureless head, with a pair of short straight horns, pointing forwards and upwards. The second figure is a misproportioned outline of a Cervine animal, probably a Reindeer, if the vague sketch of its prominent brow-antlers be accepted as a trustworthy indication. The other side bears the continuations of legs and antlers, poorly executed, together with vague notching, like that on the figured face.

From La Madelaine.

Fig. 2. The lower portion of a small cylindrical Dart-head or Arrow-point, with bevelled butt, ornamented with sequent outlines of Horses (two and a portion of a third), poorly drawn, though the second figure is not without some touch of nature.

From —— ?

Fig. 3. The bevelled butt of a Dart-head, bearing on each face an incised outline resembling the foremost animal (Antelope ?) in fig. 1, and five transverse parallel notches between the backs of the animals.

From La Madelaine.

Fig. 4. A fragment of carved bone, subtriangular in section (3 millimètres thick), tapering, crenulated by careful notching along two of the edges, and ornamented on one face with the outline of a Snake (?), and cross-etching. The Snake-like figure (broken off at the tail) is filled in with one set of crossed lines, and the space between it and the lower edge is filled in with another set, similar to the other, but not conformable or continuous with it†. The Snake (?) has apparently its mouth widely open; and an eye is distinctly given. The small space beyond the head is left without distinct hachures. The other side of the

* See pages 102 and 189 for remarks on this kind of Implement.

† Such slight cross-etching appears on some of the common pearl card-counters of the present day.

specimen is somewhat rounded (not quite angular); and the marginal notches are still more distinct, having been cut further over on this face. There are forty-three notches remaining on the lower edge in fig. 4; and the last six to the right hand are sharp, though not represented by the artist. The hollow on the opposite edge is due to a recent fracture.

The use of this notched and ornamented piece of bone must remain conjectural. Its crenulation may be compared with that in fig. 10, B. Plate XII.; and its ornamental design with that in fig. 8, B. Plate I. But whether the Snake-like figure had a special meaning, whether the notching was numerical, and whether the implement was made for use or for ornament, there is nothing to show.

From ——?

Fig. 5. The lower portion of a bevelled Dart-head, ornamented with sequences of vague figures—seemingly young, half-fledged Birds, running and fluttering along—four on one side of the fragment, and three on the other.

From La Madelaine.

Fig. 6. A subcylindrical fragment, shaped by the aboriginal artist into an elongated Horse-head, with ears, eyes, and nostrils more or less distinct. Vague longitudinal scorings are engraved on the front of the face (shown in the figure). This specimen is comparable with fig. 9, B. Plate VII. & VIII., and especially with a part of fig. 1, B. Plate XIX. & XX.

From La Madelaine.

Fig. 7. A piece of carved and perforated antler, ornamented on each side with a deep-cut outline of a Horse, heavy-headed and "groggy." In the figure a second Horse's head is indicated.

From La Madelaine.

Fig. 8. A fragment, with sketchy outline of an outspread Animal or Skin. A more carefully executed design of this kind is shown in fig. 4, B. Plate IX.

From ——?

Fig. 9. The bevelled butt of a Dart-head, bearing an obscure design, possibly intended for a long-billed Bird with a small head, such as a Heron.

From La Madelaine.

Fig. 10. A fragment of antler, dressed and ornamented. Towards each end, on both faces, four or five oblique parallel lines have been cut, so that the stem is

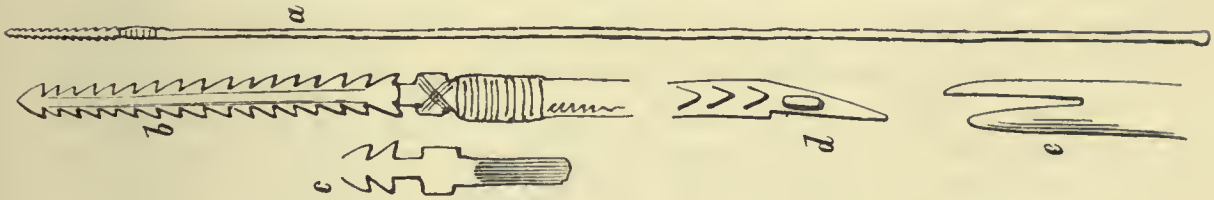
there encircled by a group or band of short incisions; and on one edge a long cut nearly unites the two sets (see the upper edge in fig. 10). The middle of each face has been smoothed; and on that shown in the figure an outline of what may perhaps be supposed to be a Bird's head, with open mouth, has been roughly engraved.

From Laugerie.

Some of the chief characters of the barbed Weapon-points, with lateral knobs below the barbs (as in B. Plates I., VI., XIV., XXII.), and of the tapering Weapon-points, with wedge-like butt-ends (as in B. Plates IX., X., XXI., XXIV.), are combined in some modern Weapons, one of which we here figure (reduced) in illustration of the subject.

Fig. 31.

A Long Harpoon or Barbed Lance. In the Liverpool Museum. (Reduced in size.)



a, The whole weapon. The shaft, 15 feet long and $1\frac{3}{8}$ inch in diameter, is made of brown wood; and one end is slit (*e*) to receive the barbed head of bone.

b, The barbed head and its fastening to the shaft. It is 10 inches long; thinned away on two faces towards the point, and its two narrow edges are barbed. Its butt, squared at the end, is wedge-shaped, being bevelled on one face, and rabbetted on the other; and it has an oblong knob or button on each side, below the barbs (see *c* and *d*).

c, The butt of the barbed bone-head. *d*, Side view of the same.

e, The split top of the wooden shaft, in which the head is fixed. This being secured with plaited cord of cocoa-nut fibre (sinnet) would indicate that the weapon came from the South Sea, probably from the Society Islands.

[Mr. T. K. Gay has favoured us with these sketches and descriptive remarks.]

B. PLATE XXV.

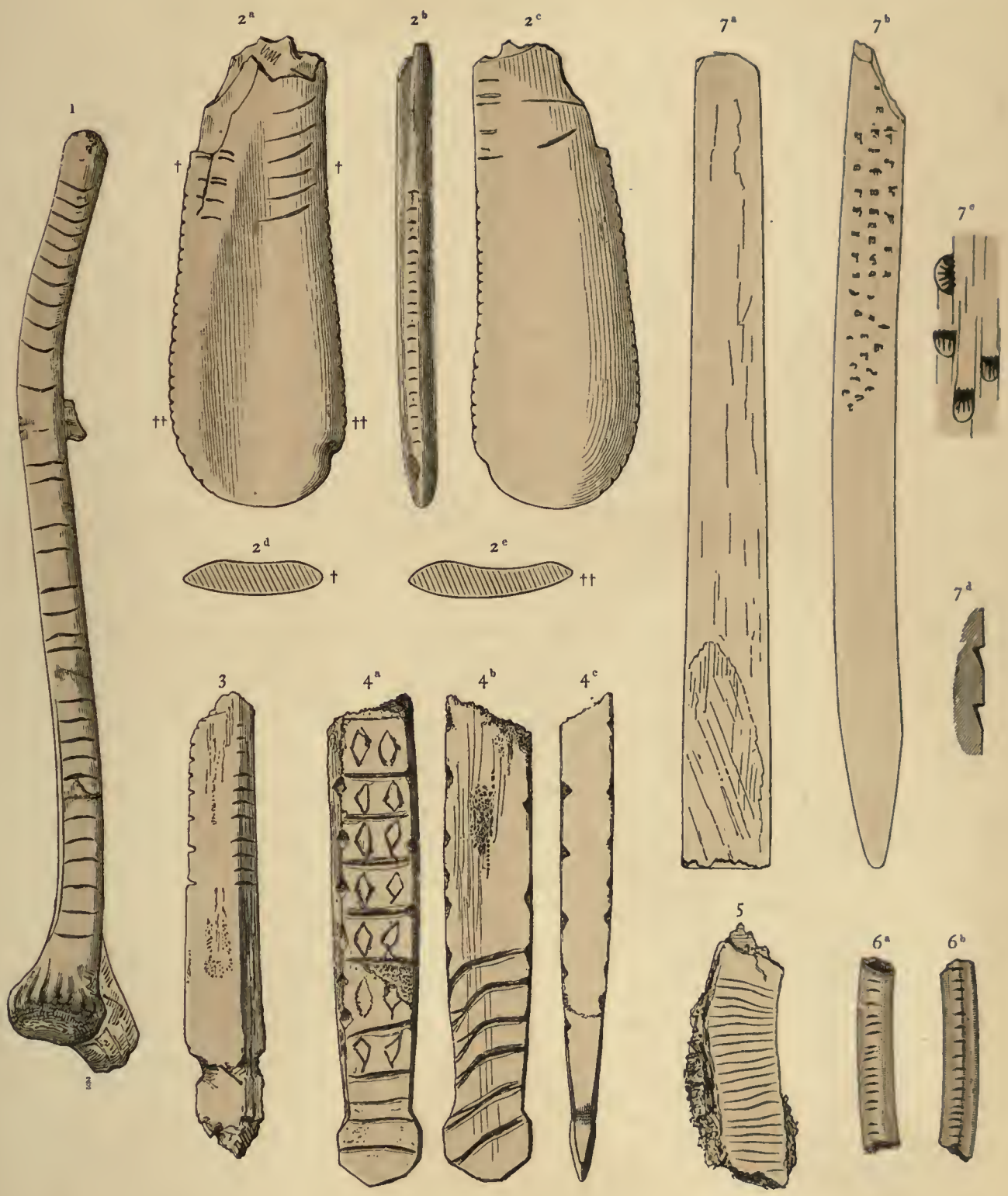
Implements of Antler and Bone, probably illustrative of Tally-marks (figs. 1, 3, 6, and perhaps others), Owner-marks (? fig. 7), of Gambling-tools (figs. 2 and 5), and other carving.

Fig. 1. Sketch of the edge of the perforated Implement, fig. 1, B. Double Plate XV. & XVI. (see page 103), showing the thirty-two transverse notches or scorings, which may possibly have been memoranda, or a reckoning of periods of time, of the results of a hunting expedition, of a game of chance or skill, or of other circumstances. Reduced to two thirds of real size. See page 189.
From La Madelaine.

Fig. 2. Bone knife-like Implement, notched and scored. *a*, Concave face. *c*, Convex face. *b*, Edge view. *d* and *e*, Sections at † and ††. See pages 185, 187.
From the Gorge d'Enfer.

Fig. 3. A triangular, stick-like, and tapering piece of bone, probably a Tally-stick. It is broken at the smaller end, jagged at the other, with opposite notches cut roughly on the three edges near it, to serve for tying on a string, perhaps for suspension. Towards the upper end, the thin edge, and one of the two corners of the thicker edge or back, are nicked with several, small, distinct, regular cuts. Both series are probably imperfect, from fracture; but one of them shows two groups of four notches, and one of three. The third edge of the fragment is cut into three long, shallow, sloping notches, forming three distant barblets (not shown in the figure). See page 188.
From La Madelaine.

Fig. 4. A carefully cut stick-like piece of Antler, oblong in section, broken at one extremity, and diminishing in thickness gradually to a sharp edge at the other end, which is roughly rounded in outline, by the sides having been cut-in above it. One of the broad faces bears at the thin end six rather broad, parallel, oblique, transverse cuts, the four upper ones somewhat curved or nearly angular (fig. 4*b*). The opposite face has eleven similar transverse cuts nearly parallel, mostly at unequal distances apart; and in the seven upper intervals are pairs of irregular lozenge-shaped incisions, apparently marks resulting from an attempt



De Wilde delin. et sculpsit.

Taylor & Francis excud.

to cut circles or ovals with a stone implement. On each edge is a series of distinct open notches; these are irregular in size, and in position, not conforming one with another, nor with the series of transverse cuts. This unfortunately broken specimen was possibly a Gambling-tool. See page 199.

From La Madelaine.

Fig. 5. A piece of crushed rib-bone, in breccia. It is scored, on one side only, with twenty-two transverse parallel scratch-like cuts. The end uppermost in the figure is broken at a cut; and the oblique line coming down from it is really a definite line passing on to the second transverse line at an acute angle. See page 199. Compare the scoring on fig. 2*a*, B. Plate XXIII.

From Les Eyzies.

Figs. 6*a*, *b*. A fragment of subcylindrical Bird-bone, with a series of parallel nicks on each side; one of the rows of little notches (fig. 6*a*) shows obscurely two *threes* and a *six*, with portions of other groups. See page 189.

From La Madelaine.

Figs. 7*a*–*d*. Portion of a Dart-head, with bevelled butt. Fig. 7*a*, natural size, shows one of the broader sides of the Implement; its surface is covered with scraped lines, not so fine as on the sculptured edge (*b*). The lines on the bevel-slope have been made with a scraper or knife having small irregular notches on its edge. Fig. 7*b*, natural size, is one of the narrow faces or edges, sculptured with small pits, forty of which remain. Fig. 7*c* shows four of the pits and a portion of the surface, enlarged to show the lines drawn by a fine scraper to receive the cuts, and to show the roughly crenated straight edge of each pit, with some traces of striæ in the cavity, as if the tool with which the holes were made was rough or serrated. At fig. 7*d* a portion of the surface is seen edgewise, showing the obliquity of the pits, which seem to have been excavated with a small, possibly stone gouge. See page 200.

From La Madelaine.

The specimen is in the Oxford Museum; and Professor Phillips, F.R.S., of Oxford, has kindly favoured us with these sketches and descriptive remarks.

B. PLATE XXVI.

Implements of cut Antler showing Owner-marks and other carving.

Fig. 1. A long tapering Harpoon or Dart-point of Antler, oblong in section, and showing on one edge, towards the butt, Marks of Ownership. These consist of a set of curved and oblique notches, in four pairs, each pair nearly or quite meeting, on one and the same side, at a sharp angle; and all are surmounted by a strong, slightly sinuous, longitudinal notch or furrow, half as long again as the set of notches. See page 195.

From La Madelaine.

Figs. 2*a*, *b*. A small lanceolate Harpoon Point, with its base slit crosswise for the insertion of the bevelled end of the stem. See B. Plate XIII. figs. 2–6, and page 97. The edges of the upper or tapering portion of the weapon are scored across with slight notches, which occur obscurely in pairs and other groupings. These may have been grooves for poison; or possibly marks for recognition. See page 193.

When fresh and sharp-pointed, no doubt these lanceolate points could be propelled with sufficient force to drive them into an object beyond their widest part, which would thus act as a barb. The transverse notch or slit in the base of this and similar weapon-heads does not seem calculated to retain them on the stem, but to allow them to be left in the wounded animal, whilst the shaft could be regained and fitted with another head. Mr. Gay informs us that some savages (New Guinea &c.) in the present day prepare their arrows so that the heads may break off easily at incised rings or notches just below; for the stems take much time and labour in preparation, and are too valuable to be lost should the prey or enemy bear them off when wounded.

From the Gorge d'Enfer.

Fig. 3. A tapering rounded Harpoon-head, broken at the point, bevelled at the butt*. This bears on one side a row of six adze-like marks, consisting of six pairs of notches: one of each pair is transverse; and the other, cut broader, crosses it at one end obliquely. The transverse notches are parallel, and are, as it were, the handles of the adze-marks; and the oblique blade-like notches

* For an account of similar Weapons, more or less ornamented, see pages 68–72, descriptive of B. Plates IX. & X.

De Wilde delin. et sculpsit.

Taylor & Francis excud.

are also parallel to each other. This may be partial ornament; but it looks like an Owner-mark. See page 195.

From La Madelaine.

Fig. 4. A tapering, pointed, rounded Harpoon-head, bevelled at the base. On one side, towards the point, there are four roughly made crosses in a row. In the upper two crosses one of the lines is doubled. This seems to be an Owner-mark. See page 195.

From La Madelaine?

Fig. 5. The bevelled butt of a broken Harpoon-head similar to figs. 3 and 4. It is marked on one edge with three deep, oblique, parallel notches, the lower two of which have a smaller notch meeting their upper end, from below, at a high angle. This was probably an Owner-mark. See page 195.

From La Madelaine?

Fig. 6. Another broken butt, like the foregoing. It shows a set of crossed lines, consisting of two long notches, oblique and parallel, but one a little in advance of the other, and four shorter, oblique, parallel notches, crossing the others at a sharp angle. There is other ornamental linear carving on this fragment; but the pattern before us has the appearance of an Owner-mark. See page 195.

From La Madelaine.

Figs. 7*a*, *b*. Fragment of a stem, oblong in section, probably of a Dart-head, with a continuous ornament of incised chevron marks on one edge (fig. 7*a*), and on the other edge (fig. 7*b*) a local patch of five oblique, parallel, slight notches. These latter may be an Owner-mark. See page 194.

From La Madelaine.

Fig. 8. A slight, subcylindrical, pointed Dart-head, with a little shoulder, or open notch, near the butt for fastening. On one side of the stem are three small, oblique, parallel notches, apparently forming an Owner-mark. See page 194.

From Laugerie Basse.

Fig. 9. This shows one edge of a slightly curved stick-like Implement of Antler, with a broad-oblong section throughout its length, and a bevelled chisel-like end, reduced in thickness by the two faces being rubbed down. The specimen is broken at the other end. The outer or slightly convex face of the Imple-

ment is smooth; the opposite has a rotted surface. On one edge of the fragment two long and deep notches have been cut, one following the other along the stem; on each side of the lower notch twelve small, oblique, parallel notches have been subsequently nicked out; whilst only one edge of the upper furrow has been cut into little oblique notches (seventeen). This looks like a designed pattern for recognition as an Owner-mark.

From La Madelaine?

Fig. 10. This shows some incised markings on a large simple Dart-head, or Harpoon, with bevelled butt. How far these letter-like cuts were intentional, or the result of feeble carving after some intended pattern, it is difficult to say. See page 198.

From La Madelaine.

Fig. 11. An imperfect, large, cylindrical Dart-head or Harpoon, with numerous transverse, oblique, subparallel notches on one side. Like the foregoing, it suggests the idea of intended lettering, or systematic signs for communication; but possibly feeble and inexperienced attempts at the production of a pattern of successive pairs of notches, one notch nearly or quite transverse and the other oblique to it (as in figs. 1 and 3), may have resulted in these quasi-inscriptive cuttings. See page 198.

From La Madelaine?

Louveau del. et lith.

Imp. Becquet à Paris.

B. PLATE XXVII.

A selection of barbed and grooved Harpoon- or Arrow-heads, cut out of Reindeer-horn. See pages 9 and 10. Figures 2, 5, and, perhaps, 6 are of the *short-pointed* type; figs. 1, 3, and 4 have been repointed, perhaps more than once; fig. 7 is *long-pointed.*

Fig. 1. This has only four barbs (broken), boldly cut, alternate, and deeply grooved. The stem has two parallel deep grooves on each face. Point broken.
From La Madelaine.

Fig. 2. Neatly subcylindrical, with six barbs, opposite and adpressed; short grooves obliquely cross the roots of the barbs. The point and some of the barbs are imperfect.
From La Madelaine.

Fig. 3. Large, with five pairs of grooved barbs, and the remains of another pair, reduced in repointing the weapon. Point and one barb broken.
From La Madelaine.

Fig. 4. Five broad, recurved, grooved, alternate barbs remain on this repointed Harpoon. The grooves on the stem are oblique, from the axil of one barb downwards and inwards to the root of the one below, sometimes touching the inner end of its groove. Other oblique opposite grooves or ornamental notches are cut chevron-wise lower down on the stem.
From La Madelaine.

Fig. 5. Upper portion of a slender cylindrical Harpoon- or Arrow-head, with six alternate, rather short, grooved barbs, and with short oblique grooves crossing some of their roots.
From La Madelaine.

Fig. 6. A pointless barbed fragment, with five pairs of carefully cut, close-set, recurved, grooved barbs.
From La Madelaine.

Fig. 7. A long terete point, with four alternate, broad, grooved barbs, and the root of another. The barbs bear two grooves on a face.
From —— ?

B. PLATE XXVIII.

A portion of the outside layer of a Tusk of an Elephant, most probably a Mammoth (*Elephas primigenius*, Blumenbach). An account of its discovery was given by M. Lartet in the 'Comptes Rendus de l'Académie des Sciences,' 1865. See page 206. It is a thin oblong piece, convex from side to side with the roundness of the tusk, and somewhat concave in the longitudinal direction, owing to its curvature. The outer surface presents what at first appears to be a medley of faintly scratched lines; but, on closer and more careful inspection, they resolve themselves into a characteristic outline of a hairy Elephant, with some of the lines doubled and redoubled apparently by the old artist's repeated attempts to sketch out the main features of his subject. The lofty skull and hollow forehead are recognizable as striking features, characteristic of the Siberian Mammoth at St. Petersburg *, of the skull of the Mammoth from Ilford, Essex, preserved in the British Museum †, and of the Belgian Mammoth at Brussels ‡. The small eye and long trunk of the Elephant, and the great curved tusks and shaggy hair peculiar to the Mammoth, are easily recognized. The upper and more convex sketch-lines of the back agree with the high withers of the Mammoth; and the lower and sloping dorsal lines probably had reference, in the draughtsman's mind, to some special attitude of the animal, with which also the outstretched portion of the hind leg, and the elevated tail, may be associated.

Mr. H. Woodward, F.R.S., F.G.S., has kindly communicated the interesting suggestion that the attitude of the animal, together with the vertical position of the trunk, would well accord with the idea of one of a herd of Elephants coming down by moonlight to drink, and that the confusing *double lines* might then be explained as an attempt, on the part of the artist, to represent the rest of the herd. In running, or when alarmed, the trunk of the Elephant is always raised. And he adds that there can be little or no doubt that the sketch, rude as it is, was the result of a *life-study* of the animal, and is consequently of the highest importance as attesting the actual presence of the living Mammoth in France when the Caves of Périgord were occupied by Man.

* See Le Hon's 'L'Homme fossile,' 1867, p. 70, woodcut.

† Much modern information on the features, distribution, and general natural history of the Mammoth, together with references to other authors, will be found in the Memoirs by Mr. Henry Woodward, F.R.S., of the British Museum, in the 'Geological Magazine,' 1864, vol. i. p. 241, and woodcut; 1868, vol. v. p. 540, plates 22 and 23; 1869, vol. vi. p. 58; and 1871, vol. viii. p. 193, pl. 4.

‡ See Dr. E. Dupont's 'L'Homme pendant les âges de la Pierre dans les Environs de Dinant-sur-Meuse' (pl. 2), 8vo, 2nd edit. 1872.

Lorrain del.

M&N Hanhart lith.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

Louveau del. et lith.

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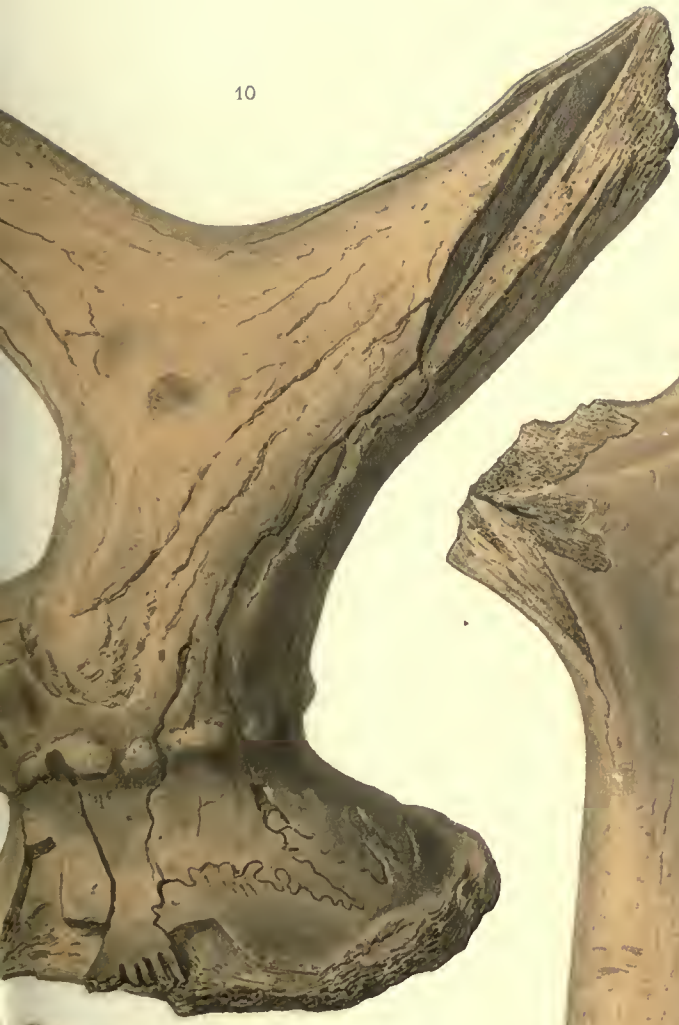

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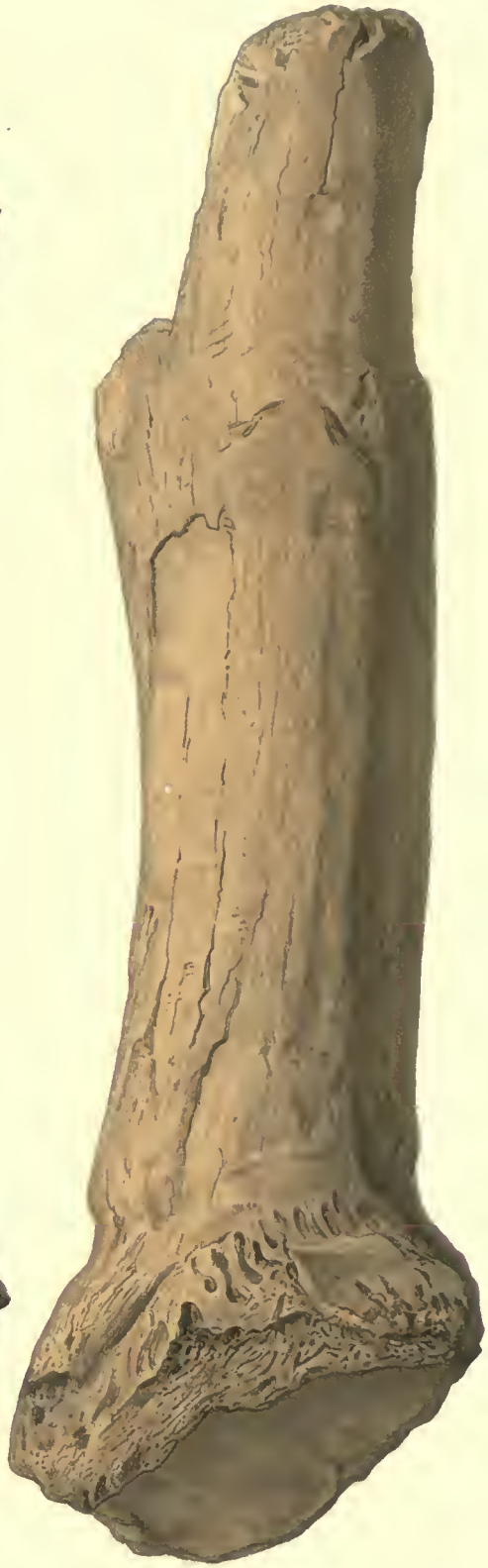

Imp Becquet a Paris.

C. SKULLS AND BONES.

C. PLATE VII. & VIII. (Double.)

In illustration of the habits and customs of the Cave-folk, with respect to their capture and slaughter of Reindeer at perhaps all seasons of the year and in great abundance *, the late M. Lartet arranged in this Plate a series of Reindeer Antlers, in various conditions, of different ages, and in several stages of growth. Two only are perfect (figs. 1 and 2); and only one (fig. 8) has been naturally shed, the others having been broken off from the skulls of slaughtered Deer of various ages. One specimen (fig. 10) bears marks of cutting and sawing †, such as are very common among the imperfect horns found in the Caverns which have been occupied by the Flint-folk of Périgord.

N. Laurence Austen, Esq., F.L.S., F.Z.S., of Croydon, well acquainted with the Reindeer of Norway and Lapland ‡, has favoured us with some systematic remarks on the Natural History of the Reindeer; and the description of this Plate has been drawn up with his kind assistance.

Fig. 1. This was the horn of a very young Reindeer, probably a male, judging from the thickness of the beam, and about two or three weeks old. In Norway the Reindeer-fawns in August have antlers from 5 to 9 inches in length, varying according to sex; and by November, when they lose the velvet, the horns measure from 12 to 15 inches.

From La Madelaine.

Fig. 2. A fully matured, though small, antler of the first year's growth, probably of a doe.

From La Madelaine.

Fig. 3. Imperfect horn of a young male, full first year's growth.

From La Madelaine.

* See 'Reliq. Aquit.' p. 147. † Lartet et Christy, "Cavernes du Périgord," 1864, p. 27.

‡ See "The Wild Reindeer of Norway (*Tarandus rangifer*)," by Mr. N. L. Austen, in 'Land and Water,' January and February, 1871.

Fig. 4. Another, of larger size.
From ——?

Fig. 5. Another, differing from the foregoing in size and curvature.
From La Madelaine.

Fig. 6. Another, subtriangular in section.
From Laugerie.

Fig. 7. This is probably an abnormal second-year's antler, wanting in development of the brow-antler.
From Laugerie Basse.

Fig. 8. A shed second-year's antler (imperfect), possibly female.
From Laugerie Basse.

Fig. 9. Imperfect full-grown antler of a doe four or five years old. The broken upper extremity on the left hand is thin and flattish.
From Laugerie Basse.

Fig. 10. Imperfect antler of a Reindeer-stag four years old. In this specimen the beam has been cut and sawn on the figured side, at the upper right-hand extremity.
From Laugerie.

Fig. 11. A broken antler, not fully developed, belonging to an immature male, with the vascular markings unusually pronounced; or possibly a deteriorated antler of an old Deer. The full development of antler is not attained in the Norwegian Reindeer until they are seven or eight years old; additional "points" do not appear to be developed after that period; and in advanced life the antlers deteriorate from year to year.
From ——?

Fig. 12. Subcylindrical portion of the antler of a full-grown Deer, aged seven or eight years or more.
From La Madelaine.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

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Louveau del. et lith.

Imp. Becquet à Paris

A. STONE IMPLEMENTS.

A. PLATE XXXVIII. & XXXIX. (Double.)

Several of the large clumsy Knives, heavy Side-scrapers, Choppers, or one-edged cleaver-like flint Implements from Le Moustier, are here shown. Each is carefully dressed to a sharp hatchet-edge, usually curved, along one margin, and elsewhere retaining some portion of the surface and outer crust of the original flint nodule, which had been in most instances somewhat water-worn. They also bear patches of discoloured calcareous incrustation; and there are particles of mica in the adherent ochreous earth. The unchipped portion, or back, of these Implements fits more or less easily to the hand; and thus they are adapted for hewing and splitting wood, cracking bones, scraping skins, and other purposes. They might be used as Hand-stones (Casse-têtes), in close fight, or as Wedges. Some may be only half-made Implements—further manipulation producing such sharp-pointed but blunt-butted tools as are figured in A. Plate XVII. figs. 1 & 2, and in A. Plate XXVIII. figs. 1 & 2 (see pages 78 and 119), and still more labour perfecting the better dressed lanceolate specimens found at Le Moustier, such as A. Plate III. fig. 2, page 6.

Such as are here figured are not rare at Le Moustier (see A. Plate V., A. Plate XVII. figs. 3 & 4, and A. Plate XXV., pages 17, 78, and 114), together with such approximate forms as are shown in A. Plate XII. page 39. A few were met with at Les Eyzies and La Madelaine*.

The small specimen, fig. 2, differs from the others on this Plate, not only in size, but in being a flake, with a strong "bulb of percussion" on the face which is not figured. This would serve for a Scraper, Knife, Chisel, or a light Chopper;

* Some English localities for these Chopper-stones have been mentioned at page 119; and we may add that, in his 'Ancient Stone Implements &c. of Great Britain' (1872), Mr. John Evans, F.R.S., figures one from Santon-Downham, Suffolk (fig. 437, p. 505), one from Brandon, Essex (fig. 443, p. 511), and one from Stoke-Newington, Middlesex (fig. 453, p. 525), and describes the probable method of their fashioning and their uses. M. Mortillet observes that analogous flint implements have been found in the Quaternary Alluviums of the Somme and the Seine, see 'Matériaux pour l'histoire de l'Homme,' vol. iv. (1868) p. 455, fig. 110. Sir John Lubbock makes mention of this kind of tool in his 'Prehistoric Times' (1865), p. 251.

or it might have been fastened with others along a stick or staff to make a continuous cutting edge, like an Aztec "Mahquahuitl" *, or other

> . . . . . "Ugly stone-set things,
> Most like to knives."—W. Morris's *Jason*, p. 180.

Such triangular and other short flint flakes, dressed with an angular or curved edge†, are common in the Dordogne Caves, and are not wanting wherever stone implements abound. See pages 117, 119, 120, 155.

Fig. 1. Irregular oblong; brownish-grey.

Fig. 2. A dark-coloured subtriangular flake, dressed to a curved cutting edge on one margin.

Fig. 3. Brownish grey; subtriangular; the back is awkward for handling, possibly from inadvertent fracture.

Fig. 4. Dark grey; subquadrangular; with a nearly straight edge, and a natural back ready to the hand.

Fig. 5. Dark grey; subtriangular, with curved edge.

Fig. 6. Brownish grey; acute-ovate; carefully dressed, so that the elliptical curve of the cutting edge corresponds with that of the natural portion of the flint nodule, which remains as the back of the Implement, fitting easily to the hand.

Figure.	Length		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	116	4·567	23‡	0·906	40	1·575
2.	80	3·150	53‡	2·087	21	0·827
3.	140	5·512	98‡	3·858	33	1·299
4.	127	5·000	107	4·213	47	1·850
5.	183	7·205	129	5·079	51	2·008
6.	119	4·685	82	3·228	49	1·929

* These stone-edged War-clubs are described and illustrated in the 'Smithsonian Contributions to Knowledge,' vol. i. p. 211, *note*, fig. 101; vol. ii. p. 180, figs. 62–64; in Col. A. Lane Fox's Lecture "On Primitive Warfare" (Journ. United Service Instit. 1867), p. 25, pl. 6. figs. 78–80; Evans's 'Ancient Stone Implements' &c. (1872), p. 265; and the works to which they refer.

† For such flakes having a semicircular edge, see Evans's 'Stone Implements' &c. pp. 270 *et seq.*, figs. 204 &c., and pp. 454, 470, 562, &c. Triangular dressed flakes are shown at p. 454, fig. 395, and p. 493. fig. 425, of the same work.

See also 'Matériaux pour l'histoire de l'Homme,' vol. v. 1869, p. 461, pl. 29. figs. 4, 5, 10, 11, &c., illustrative of this kind of dressed flake from Chez-Pouré (Brive).

‡ Broader than the figure.

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XL.

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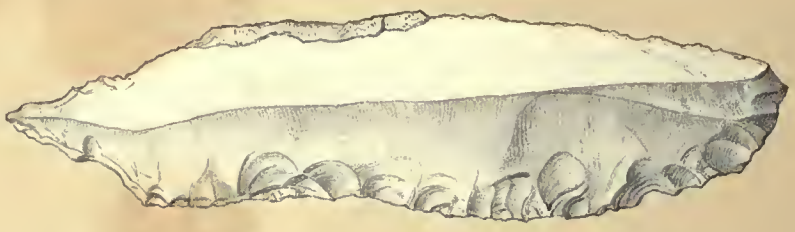

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Louveau del. et lith.

Imp. Becquet à Paris

A. PLATE XL.

The Implements here figured are from the Moustier Cave. Fig. 1 is a ridge-flake, pointed at one end by dressing and wear as a scraping and boring tool, analogues of which may be seen in A. Plate VIII. fig. 8; Plate XV. fig. 4; Plate XVIII. figs. 2, 8, 9, 11; and Plate XXI. fig. 3. Figures 2 and 3 are broad short flakes dressed to a triangular outline, and are to be classed among similar forms referred to at pages 136 and 172. The symmetrical point of fig. 2, turned to the left hand upwards, and that of fig. 3, turned to the right hand, are comparable with the very symmetrical lance-like points of the similarly prepared flakes A. Plate XXVIII. fig. 2, and Plate XXXIII. fig. 3; and to this symmetry of proportion even the larger and coarser flake Implement, A. Plate XXXVII. fig. 4, also from Le Moustier, markedly approximates. Figures 5, 6, and 7 are flakes dressed carefully into lanceolate, plano-convex weapons, with neat butts; and very many analogous forms, varying from the narrow specimen in A. Plate XIX. fig. 1, to the large Implement, A. Plate III. fig. 1, are not rare at Le Moustier and elsewhere. Figure 4 is more highly finished, dressed on both faces, biconvex, oval, and trenchant along its whole margin. Larger tools of this style, but more lanceolate, and thicker at the butt, are characteristic of Le Moustier (as A. Plate III. fig. 2; Plate XVII. figs. 1 and 2; Plate XXI. fig. 5; and Plate XXVIII. fig. 1), and remind the archæologist, as has been before remarked, of the so-called Drift-type of Implement from the old gravels.

Fig. 1. A mottled grey arched flake, pointed at one end; chipped on one edge, and retaining some of the original crust at the other.

Fig. 2. Mottled, dark-grey, broad flake, carefully dressed to a triangle, one point of which (to the left hand in the figure) is sharp and regular.

Fig. 3. Somewhat similar to fig. 2, but less symmetrical.

Fig. 4. Brownish-grey, broad-oval, biconvex, sharp along the edge, and dressed on both faces. The notch is probably of recent origin.

Fig. 5. Dark-grey flake retaining "bulb of percussion," shaped by dressing on the ridge-side into a sharply pointed Lance-head (?), with thick butt. A patch of

original crust remains on the convex face, and some tufaceous patches adhere to the other.

Fig. 6. Dark-grey, bulbed flake, shaped into a narrow lanceolate Tool or Weapon. A little of the crust still remains.

Fig. 7. Portion of a dark-grey flake, very neatly dressed. Some original crust remains at the greatest convexity.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inches.	millim.	inch.	millim.	inch.
1.	106	4·173	27	1·063	11	0·433
2.	56	2·205	60	2·362	10	0·394
3.	65	2·559	45	1·772	15	0·591
4.	50	1·986	41	1·614	13	0·512
5.	70	2·756	50	1·969	15	0·591
6.	60	2·362	27	1·063	8	0·315
7.	80	3·150	35	1·378	13	0·512

RELIQUIÆ AQUITANICÆ.

(DORDOGNE.)

A. PL. XLI.

Louveau del. et lith.

Imp. Becquet à Paris.

Fig. 7. Part of a narrow, brownish-grey flake, which had been neatly dressed into a long lanceolate Weapon by chipping chiefly on the convex face.
From Laugerie.

Fig. 8. An arched, cream-coloured flake, roughly pointed at the bulb-end.
From the Gorge d'Enfer.

Fig. 9. A small, dull-yellow, ridge-flake, worn on one edge by use as a Side-scraper.
From La Madelaine.

Fig. 10. Part of a narrow flake of white chalcedonic flint, worn down on one side as a Side-scraper, and dressed as a Saw on the other. It retains thirteen notches, and is broken through the fourteenth.
From La Madelaine.

Fig. 11. Portion of a flake of Rock-crystal, irregularly chipped.
From Laugerie Haute.

Fig. 12. A small narrow flake, mottled cream-coloured, worn on one edge as a Side-scraper, and dressed with four broad notches on the other, for scraping cylindrical Needles and small stems.
From Laugerie Basse.

Fig. 13. Small flake, chipped or worn at the point as a Drill (?). (Lost.)

Fig. 14. A mottled purplish and grey flake, dressed at the broad end into a Drill, or worn by scraping into a notch and point.
From the Gorge d'Enfer.

Fig. 15. A purplish-grey translucent flake, carefully trimmed to a lanceolate form, with a cutting edge all round. Point broken.
From Laugerie.

Fig. 16. Piece of a honey-coloured flake; the edges straightened by use or dressing, and the end pointed, probably by use as a Scraper.
From Laugerie.

Fig. 17. Small dark flake, dressed like fig. 15, but narrow-lanceolate. Point lost.
From La Madelaine.

Fig. 18. Dull-grey, narrow flake, worn down along one edge as a Side-scraper.
From La Madelaine.

Fig. 19. Dark, arched flake, dressed or worn to a Drilling-point at one end.
From La Madelaine.

A. PLATE XLI.

A miscellaneous group of dressed and worn Implements, made out of flakes; from various Stations. Figures 1, 7, 15, and 17 (all broken) are lanceolate Weapon-heads, shaped with care. Figures 2, 8, 13, 14, 16, 19, 21, and 23 have either been dressed as Drills, or have been worn at one end into slopes or notches, with a point remaining in the middle. Figure 3 is worn into two deep notches. Figure 10 seems to be a Saw; figs. 5 and 12 have a series of broad lateral notches, more probably for scraping needles* than for sawing; and these, as well as figs. 9, 13, 18, 20, 22, and 24, seem to have been used as Side-scrapers—fig. 22 on both edges, and fig. 24, as is more usual, only on half an edge†. All these kinds of Implements, or their analogues, have been already noticed in other portions of this book. That some of the small ones may have been *tattooing*-tools has been suggested by our friend Mr. Sydney Webb, of Redhill.

Fig. 1. Brownish-grey flake trimmed into a lanceolate Weapon by chipping chiefly on the convex face. Broken.
From Laugerie.

Fig. 2. Portion of a flake, worn at one end as a Drill or Scraper. (Lost.)

Fig. 3. Bulb-end of a small mottled-grey flake, worn into a notch on each side ‡.
From La Madelaine.

Fig. 4. Piece of a small, simple, ridge-flake of clear Rock-crystal §.
From Laugerie Haute.

Fig. 5. Portion of a narrow, dark-coloured flake, worn down on one edge, as a Side-scraper, and either dressed on the other as a coarse Saw of seven teeth, or worn into five notches by scraping small cylindrical stems and Needles.
From Les Eyzies.

Fig. 6. The apex of a yellowish-grey flake, slightly chipped on edges and point.
From the Gorge d'Enfer.

* As suggested for similar specimens, from the Trou de Chaleux, by Dr. E. Dupont, 'L'Homme pendant les Ages de la Pierre,' 2nd Edit., 1872, pages 149 and 151.

† Some similar implements, from the Trou de Chaleux, are figured in plates 6 and 7 of Dr. Dupont's 'Notices préliminaires sur les fouilles dans les cavernes de la Belgique,' vol. ii. 1867, and reproduced in his 'L'Homme' &c. 1872.

‡ Compare figs. 4 and 8, pl. 6, Dupont's 'Notices préliminaires' &c. vol. ii.

§ Flakes and angular pieces of rock-crystal and vein-quartz have been met with also at Laugerie Basse and La Madelaine.

Fig. 20. Brown flake, worn down on one edge as a Side-scraper.
From La Madelaine.

Fig. 21. Coarse cream-coloured flake, either dressed or worn to a point, the semi-circular notch on one side of which seems to have resulted from scraping a cylindrical stem.
From the Gorge d'Enfer.

Fig. 22. Dark-grey narrow flake, worn at both edges by use as a double Side-scraper, or purposely blunted for use as a hand-drill, or other pointed tool.
From Laugerie Basse?

Fig. 23. Grey flake, worn at the bulb-end into two unequal notches and a central blunt point (figured downwards).
From Laugerie.

Fig. 24. Light-brown narrow flake, worn halfway down one edge by use as a Side-scraper.
From ——?

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inches.	millim.	inch.	millim.	inch.
1.*	54	2·126	22	0·866	5	0·197
2.*	40	1·575	18	0·709		
3.	19	0·748	12	0·472	3	0·118
4.*	28	1·102	15	0·591	3	0·118
5.*	32	1·260	8	0·315	2	0·079
6.*	36	1·417	16	0·630	4	0·157
7.*	59	2·323	17	0·669	7	0·276
8.	75	2·953	20	0·787	7	0·276
9.	52	2·074	10	0·393	6	0·236
10.*	43	1·693	6	0·236	3	0·118
11.	51	2·008	28	1·102		
12.	38	1·496	7	0·276	3	0·118
13.	39	1·535	8	0·315		
14.	85	3·347	25	0·984	6	0·236
15.*	37	1·457	19	0·748	5	0·197
16.*	47	1·850	26	1·024	8	0·315
17.*	38	1·496	17	0·669	5	0·197
18.	56	2·205	7	0·276	4	0·157
19.	66	2·598	13	0·512	4	0·157
20.	62	2·441	10	0·393	4	0·157
21.	74	2·913	36	1·417	14	0·551
22.	67	2·638	8	0·315	3	0·118
23.	54	2·126	25	0·984	5	0·197
24.	52	2·074	8	0·315	4	0·157

* Shortened by fracture.

B. BONE IMPLEMENTS, &c.

B. PLATE XXIX.

Some imperfect and unfinished Harpoon-heads, cut out of Reindeer antler.

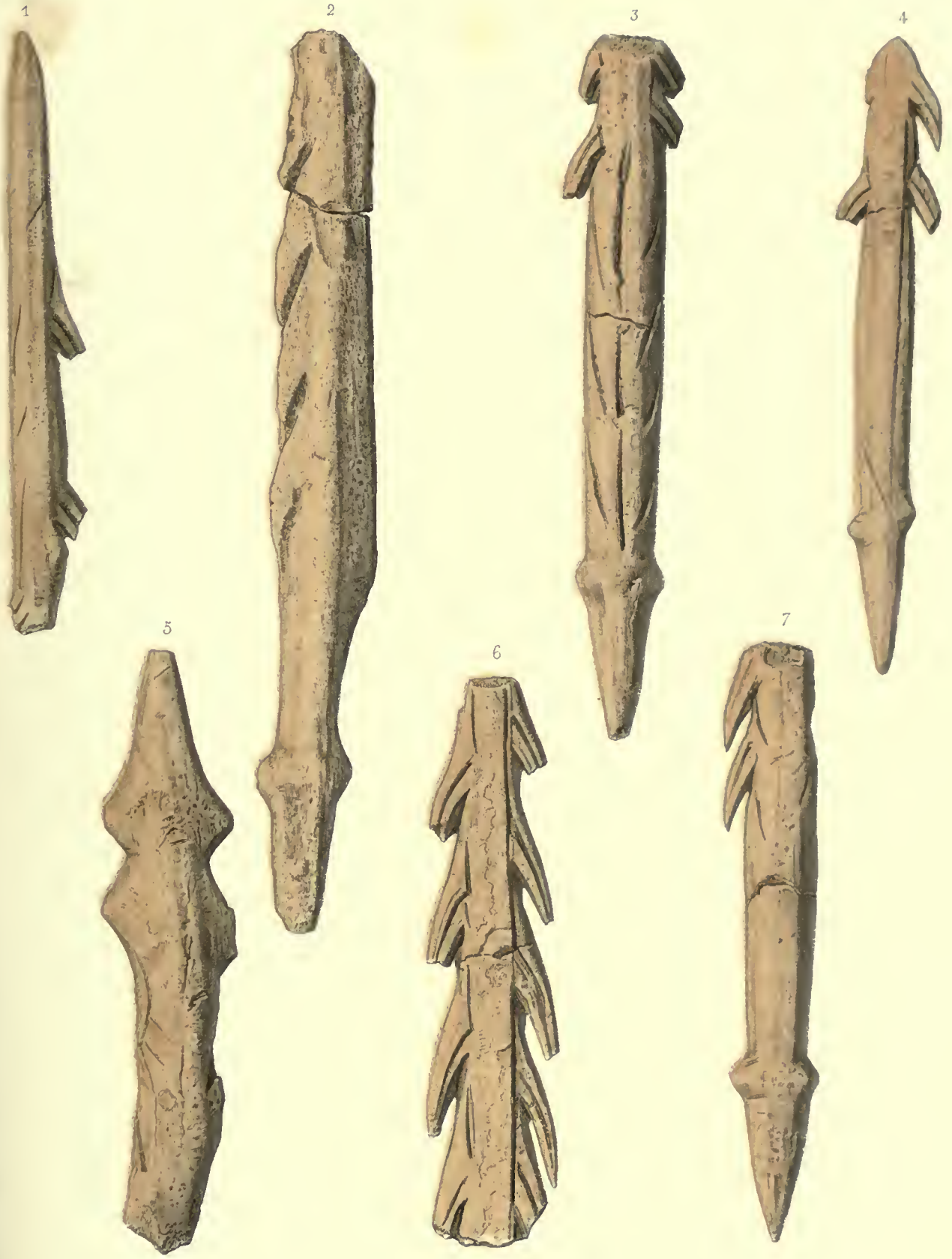
Fig. 1. Fragment of a *long-pointed* specimen. The bases of three, doubly grooved barbs remain; some irregular faint grooves mark the stem.
From ——?

Fig. 2. An unfinished weapon. The cutting of four barbs was begun uniformly on both faces at one edge. Compare fig. 4, B. Plate XXI.
From La Madelaine?

Fig. 3. The lower portion of an Harpoon-head, retaining the bases of four grooved barbs, and having the stem ornamented, on one face, with a pattern of ten nearly symmetrical notches,—three being straight, successive, and median, flanked with three oblique corresponding notches on one side, and with four smaller oblique subparallel notches on the other. Compare fig. 4, B. Plate XXVII.
From La Madelaine?

Fig. 4. A small and repointed weapon, retaining only three grooved barbs and an indication of another. A longitudinal groove and the trace of another remain on the stem (compare fig. 1, B. Plate XXVII.). The apparently intentional oblique notch, cut across the butt just above the collar, is alluded to at page 194 as being probably an Owner-mark.
From La Madelaine.

Fig. 5. This (*figured upside down*) is apparently an unfinished weapon, or rather one badly begun and cast aside. The pointed end is analogous to the usual conical butt, with its knobs, marked out by the two large notches, above which the material was not reduced, though some unskilled hand began to mark out the place of some barbs on the ill-shaped stem.
From La Madelaine.



Louveau del. et lith.

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Fig. 6. A fragment retaining nine close-set, alternate, long, grooved barbs or their roots. The stem has continuous or broken grooves along the bases of the barbs.
From La Madelaine.

Fig. 7. The butt of a broken specimen, retaining two sharp, grooved barbs, and marked with some short oblique grooves.
From La Madelaine.

Figs. 32–34.

Three bone Harpoon-heads from Tierra del Fuego, obtained during the Voyage of the 'Beagle' in 1827.
(Christy Collection.)

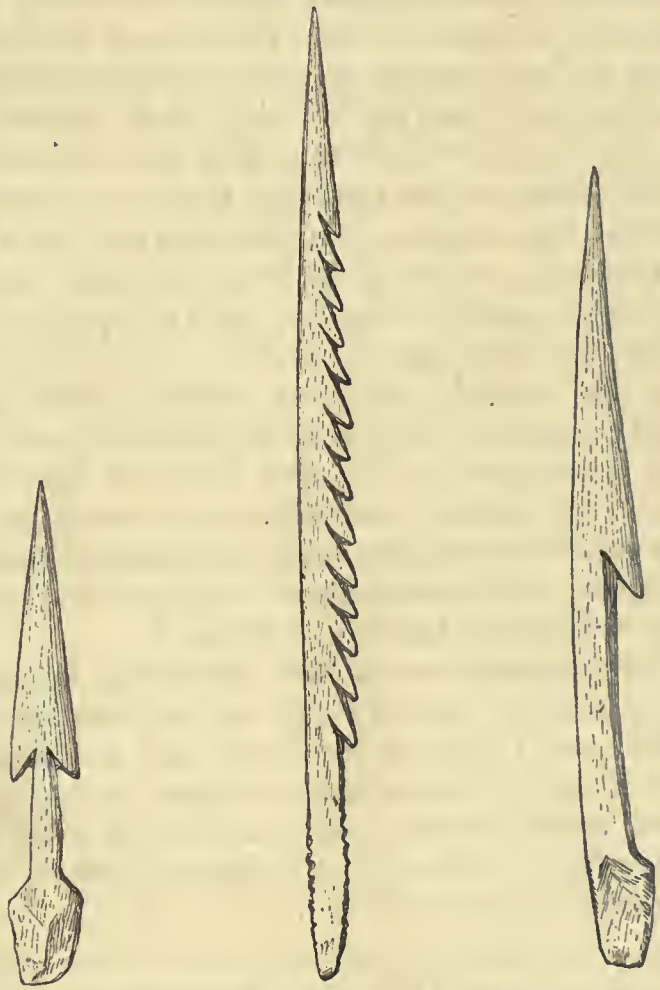

Fig. 32. $8\frac{5}{8}$ inches long. Fig. 33. 15 inches long. Fig. 34. $12\frac{1}{2}$ inches long.

B. PLATE XXX. & XXXI. (Double.)

This Plate exhibits some fine specimens of the Aquitanian Pogamagan, or Baton, made of carved and perforated antlers, common in the Caves of the Vézère, and rare elsewhere. Besides many carved pieces of antler which may be fragments of Pogamagans, we may certainly refer to the following figures as illustrative of these interesting Implements:—B. Plate II. figs. 3, 7, 8; double Plate III. & IV.; double Plate VII. & VIII. figs. 3, 6, 7; double Plate XV. & XVI. figs. 1, 2, 3; Plate XXIV. figs. 1, 7; and figs. 1, 2, 4, and 6 of the Plate before us. M. E. Massenat has figured in the 'Matériaux pour l'Histoire de l'Homme' &c., vol. v. pl. 20. fig. 1, the carved butt of a Baton of antler (with at least two holes), representing probably the head of a Bear; and another carved and perforated butt is excellently well carved into two Bulls' heads (fig. 2, p. 352); these are from Laugerie Basse, on the Vézère. The so-called "Baton" from Mont Salève ('Matériaux' &c., vol. iv. p. 154, figs. 39, 40) differs from the Aquitanian form by the central position of the hole in the rounded butt, as in the *arrow-straightening* tools of the Esquimaux (Mr. W. Boyd Dawkins); and one of Dr. Dupont's Belgian specimens from the Cave of Goyet ('Bullet. Acad. Sc. Belgique,' vol. xxvii. p. 274; 'L'Homme' &c., 2nd Edit., p. 117; and 'Matériaux' &c., vol. v. p. 318, pl. 16), ornamented with a Fish, presents that character still more markedly, whilst the other, though rough, also has the perforation in the broad and shortened butt. Those found at Schussenreid, in Würtemberg, on the other hand, are, like some of the Dordogne specimens, rough antlers pierced with one or two holes. The butt of a Pogamagan, not perforated, but ornamented with incised patterns of lines, found in the Magrite Cave at Pont-à-Lesse, Belgium, is figured in Dr. Dupont's 'L'Homme pendant les Ages de la Pierre,' 2nd Edit., p. 93, fig. 9.

Some at least of the possible uses of these ornamented Implements have been indicated above, at pages 30, 32, 102, 37, 50, and 189; and our friend Dr. Broca, of Paris, has elaborated a theory of social order and rank among the Périgord Aborigines, and of grades, whether regal or official, marked by the holding of simple, one-holed, and successively many-holed Batons, either in home-society, in the Chase, or in War*. This wide and interesting subject, however, we may still regard as open to further research.

* See Dr. Broca's interesting Lecture on the Cave-folk of the Vézère, before the French Association for the Advancement of Science, at Bordeaux in 1872; 'Revue Scientifique de la France' &c., 2e sér., 2e année, No. 20, 16 Nov. 1872, pp. 457 &c.; and in 'Nature,' 1873, pp. 369 &c.

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(DORDOGNE.)

Louveau del. et lith.

Imp. Becquet à Paris

Fig. 1. A fragment of a carved stem of antler; it is slightly curved, oblong in section towards the apex, and subcylindrical at the broken end. On the figured face is an isolated, eared, hornless head, possibly Bovine, with a shaggy jowl, succeeded by a flower-like outline. On the other face two somewhat similar flower-like figures are seen, succeeded towards the apex by two patterns consisting of an obliquely transverse furrow crossed in one instance by four, and in the other by three short and slightly curved notches. The concave margin has seven transverse unequal notches (perhaps Tally-marks), some of which show themselves in the figure above the head and flower. The convex margin has a long shallow notch and two blunt barb-like projections, beyond which it is partially corroded on the figured side, but somewhat polished, perhaps by use, on the opposite face.

From La Madelaine.

Fig. 2. A broken Baton or Pogamagan, made of a shed antler, ornamented with a row of Horses* on each side. These appear to be standing, have large heads as usual†, hog-manes, excepting two, one on each side of the butt-end; and their tails seem to be rather long and narrow.

The perforation interferes with the head of a Horse on each side; also with the tail of one, and the head of the other Horse, at the butt-end; for one of these is reversed in position. Both have the mane indicated by the usual line parallel with the neck.

The concave edge of the antler is ornamented with a shallow, incised, mesial line and numerous short oblique notches set off on each side of it.

From La Madelaine.

Fig. 3. A fragment of a large perforated Pogamagan or Baton of antler, ornamented with a shallow spiral furrow encircling the stem.

From Laugerie Basse.

* See Prof. Owen's remarks on some figured Horses from the Bruniquel and La-Madelaine Caves, their identity with the fossil *Equus* of Auvergne, and the evident accuracy of the primæval artist—'Philos. Transact.,' 1869, pp. 517, 535–540.

† Respecting these large-headed Horses, our friend Mr. W. Boyd Dawkins, F.R.S., obligingly writes:—"There is a most important point for you, which I lighted on in the Museum at Lyons. The figures of the Horses from Périgord are remarkable for the large size of the head; and the Horse must have been a clumsy pony with the head of a cart-horse. That this is literally true is proved by a skeleton just set up by my friend M. Lortet, from the Station de Solutré. It is that of a pony with a huge ugly head. Your palæolithic artists had an eye for proportion, and, where they can be tested, are literally accurate." (Nov. 28, 1873.)

See also M. E. Pictte's account of the similar Horses figured on bone from the Gourdan Cave, Haute Garonne; 'Matériaux pour l'hist. de l'Homme,' 2e sér., vol. v. pp. 69 & 70; and 'Bullet. Soc. Anthrop. Paris,' 1873.

Fig. 4. Another broken Baton, made of a shed antler, perforated with one hole, and ornamented on one side with Horses, standing or gently moving, in very close sequence, and with a pattern of longitudinal and transverse scoring*, and at least one Horse (of which a portion remains), on the other. The round hole also is bordered with a groove on the side not figured, and with a partial marginal groove on the figured face. The Horses are relatively large, with rather long thin tails, and heavy heads; their manes are indicated by the usual horizontal line.

From La Madelaine.

Fig. 5. A Pogamagan or Baton, consisting of a small antler (detached by force from the frontal bone), pierced with a single hole. Imperfect.

From ——?

* Like the pattern on fig. 8, in B. Plate VII. & VIII., but larger and of better design.

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(*DORDOGNE*.)

G De Wilde del et lith.

M.& N. Hanhart imp

A. STONE IMPLEMENTS.

A. PLATE XLII.

This selection of specimens, mostly differing from any figured in the foregoing Plates, comprises some tools which must have been in use with the old Cave-folk in their ordinary work of flaying, cutting, scraping, carving, &c.; whilst fig. 10 illustrates some useless splinters struck off tools already used, in the process of redressing them, or converting them into implements of another sort.

Fig. 1. A broad, thin, triangular, somewhat curved flake of light-brown subtranslucent Flint, with the bulb at the blunt corner, on the flake-face (not shown in the figure). It is slightly concave on that side. The outer face retains the original drab granular crust, with a piece of shell (*Inoceramus*) partially converted into orbicular silex. There are some parallel striæ (not shown in the drawing) on the old crust, probably due to river-action or ice; also numerous small calcareous concretions, due to minute tubular concretions over rootlets (?), of later date than the scoring.

The three edges of this large flake have been sharpened by flaking (with the scaling on the outer face), especially near and at the two corners distant from the bulb and lowest in the figure, one rounded, the other angular, so that, held by the thickest corner, the implement could be used as a flaying or fleshing knife. A somewhat similar implement, of thin green slate, irregularly oval, 6 by 3 inches, in the Christy Collection, is labelled as a fleshing tool used by the Esquimaux. In this one edge is made fit for the hand by wood-fibre (?) and sinew being passed to and fro through holes in the slate near the margin, and enveloping some straighter parallel strings of the same, intermixed with a reddish cement. This is accompanied by another, smaller tool, with a straight edge, also from the Esquimaux.

From Le Moustier.

Fig. 2. A Double Scraper, made from a subtranslucent grey flake by careful and neat dressing at sides and ends on the ridge-face, similar to the work bestowed on the Javelin-heads &c. in A. Plates IV. and VI.

From Laugerie.

Fig. 3. Crescent-ended Implement, consisting of a rough, broad, fossiliferous flake, drab passing into light-brown, hollowed and used at the thin end.
From La Madelaine.

Fig. 4. A mottled-grey Flake-scraper, with its broad end squared, perhaps by use; the narrower end has been partially tanged and roughly used.
From Les Eyzies.

Fig. 5. Chisel-like Implement of dark-grey flint; the broad oblique end has been used; the narrow end has been partially tanged and used also.
From La Madelaine.

Fig. 6. Dark-grey, spicular, narrow, arched flake, dressed or worn on the sides at one end to serve as a Drill or Rimer. The scaling is from the flake-face and on the ridge-face on the right-hand side of fig. 6 *a*, from the ridge-face and on the flake-face on the other side (right-hand side of fig. 6 *b*). This would be produced by using the instrument as a Drill turned one way only (from left to right); or by applying the implement as a Scraper, and using the two edges successively, with a turn of the hand. Evidence of use is visible also on one edge near the bulb-end.
From La Madelaine.

Fig. 7. A narrow crescent-ended Implement, of a dark-grey spicular flake neatly dressed to a uniformity of edge on the sides and broad end, and hollowed and used at the narrow end.
From La Madelaine.

Fig. 8. A dark-grey spicular flake, tanged at the but-end, sharpened at the other, by dressing or by use, into a double Angle- or Shoulder-scraper. As the scaling is from the flake-face on each side, though rougher on one edge than the other, this cannot have been used as a Drill in hard substances. The sides have been carefully reduced to uniform edges.
From La Madelaine.

Fig. 9. A small, brownish-grey, subtranslucent flake, deeply notched on one side near one end, either by use as a Shoulder-scraper, or by dressing (scaled from the flake-face), and ending in a broad-angled solid point, fit for drilling holes, or rather, perhaps, for engraving lines. [The edge of the notch is too coarse in the drawings figs. 9 *a*, 9 *b*.]
From La Madelaine.

Fig. 10. A Splinter from the side of a grey flake, which had been used as a Shoulder- or Angle-scraper, or some similar Implement. Fig. 10 *a* corresponds with the left-hand side of fig. 8 *a*. These oblique knife-like Splinters, triangular in section, and of various sizes, are common in most of the Caves, and evidently have resulted from the "tanging" of flakes, or their reduction in width at the ends. See several figures in A. Plates VII. & VIII. &c.

From La Madelaine.

Figure.	Length.		Breadth.		Thickness.	
	French.	English.	French.	English.	French.	English.
	millim.	inch.	millim.	inch.	millim.	inch.
1.	165	6·496	137	5·394	19	0·748
2.	62	2·441	29	1·142	12	0·472
3.	85	3·347	35	1·378	15	0·591
4.	65	2·559	19	0·748	7	0·276
5.	60	2·362	22	0·866	9	0·354
6.	85	3·347	13	0·512	5	0·197
7.	92	3·622	21	0·827	5	0·197
8.	83	3·268	23	0·906	7	0·276
9.	32	1·260	8	0·315	3	0·118
10.	70	2·756	10	0·394	8	0·315

C. SKULLS AND BONES.

C. PLATE IX. & X. (Double.)

[All the figures, drawn on the stone from the originals, are reversed in the plate. They were sketched in geometric projection by aid of Gavard's diagraph, and reduced to half-size by Sauvage's pantograph.]

Fig. 1 *a*. Frontal, from La Madelaine, front view. 1 *b*. Internal cast of the same.

Fig. 2. Half of the Upper Jaw of "No. 4" from Cro-Magnon, with the second premolar and the first two molars still in place and much worn.

Fig. 3. Portion of the Lower Jaw of the Man of La Madelaine. (See, in the text, p. 267; another view of the same, fig. 94.)

Fig. 4. Fragment of the Lower Jaw of "No. 4" from Cro-Magnon, bearing two molars much worn.

Fig. 5. First lumbar Vertebra of the "Old Man" of Cro-Magnon, showing the separation of the diapophysis into a metapophysis and parapophysis.

Fig. 6 *a*. The Pelvis of "No. 1" from Cro-Magnon, reconstructed by M. Hamy: represented as seen from above, and so that the plane of the upper narrowing is horizontal. 6 *b*. The same, seen from behind, for the particular study of the sacrum.

Fig. 7. Shaft and upper extremity of a left Radius from Cro-Magnon, view of the anterior surface.

Fig. 8. Shaft and lower extremity of another Radius from the same place, view of the posterior surface, to show the depth of the grooves.

Fig. 9. Left Ulna of one of the subjects from Cro-Magnon, profile, to exhibit the incurvation of the upper extremity.

Fig. 10 *a*. Right Femur of the Man of La Madelaine, anterior surface. 10 *b*. Profile of the same, to show its antero-posterior curve and the flattening of the

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(DORDOGNE.)

H. Formant del. et lith.

Imp. Becquet à Paris

upper fourth of its outer edge. 10 *c*. Section of this Femur at its narrowest point, showing the projection of the *linea aspera* in the form of a small column.

Fig. 11 *a*. Right Tibia of the same subject, represented in profile, to give an idea of the amount of its transverse flattening. 11 *b*. Section of the same bone at the level of the *foramen nutritium*, showing the lozenge-shape resulting from platycnemism.

Fig. 12. Right Fibula of the Man of Laugerie Basse "No. 4," with the deep groove in its outer surface.

Figs. 13 *a*, 13 *b*, and 13 *c*. The left first Metatarsal of the same, views of the dorsal and plantar surfaces and profile, to show the extent of its metatarso-phalangial surface of articulation.

Fig. 14. Astragalus of the "Old Man" of Cro-Magnon, seen from above.

Fig. 15. Cuboid from the same subject, in the same position.

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PRINTED BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

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