

FIG. 1.—BÂTON DE COMMANDEMENT WITH FIGURES OF HORSES ( $\frac{1}{2}$ ). (Coll. Lartet and Christy.)

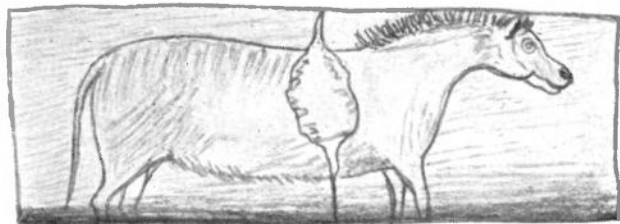


FIG. 2.—DRAWING OF A HORSE ON A PORTION OF REINDEER HORN FROM KESSLERLOCH ( $\frac{1}{2}$ ).

ON THE PREHISTORIC HORSES OF EUROPE AND  
THEIR SUPPOSED DOMESTICATION IN PALÆO-  
LITHIC TIMES.

By ROBERT MUNRO, M.A., M.D., LL.D.

During the earlier stages of man's career on the globe nomadic families or tribes, in selecting a temporary place of abode, whether a cave, rockshelter, or hut, would be influenced chiefly by the amount of edible materials to be found in the neighbourhood. As, however, fruits and other natural products came to maturity only at particular seasons of the year their visitations to special localities would be regulated accordingly. For this reason we find primitive races wandering from one locality to another, now gathering fruits and seeds, now hunting wild animals, or, as a last resource, feeding on shell-fish and other produce of the sea-shore. But the most successful of all methods for equalizing and supplementing their precarious food supplies was the result of that happy thought which led them to cultivate grain, and to rear animals, either for their milk, or to be kept alive till such time as they were required for food. It is not necessary to suppose that the practice of domesticating certain animals was a monopoly of any single race, as its advantages are so manifest that they may have been recognized and practised by more than one community independent of each other, just as the llama and alpaca were already in a state of domestication before the discovery of America by Europeans. The onward march of civilization is only partially affected by changes in the environment, so that it is quite possible for two or more branches of the human family to progress on parallel lines, under reasoning faculties derived from a common origin, and to evolve analogous civilizations, without being influenced by each other's ways and means. On a retrospective glance at the successive civilizations which have

flourished in the past, and on the ruins of which modern civilization has been constructed, there are certain great discoveries, bequeathed to us from our early forefathers, which have ever since continued to be, as it were, the backbone of all social communities. Of these outstanding features in the evolution of present humanity agriculture and the domestication of animals are, next to the invention of tools and weapons, the most important.

Before discussing the problem of the domestication of the horse from the stand-point of archæology, which is the main object of this paper, there are a few interesting facts bearing on the history of that animal to be gleaned from palæontology which, being of a preliminary nature, will be first disposed of.

#### *Palæontological Notes.*

From a study of the progressive changes in the limbs of a few extinct genera and species of *Equidæ*, the genus *Caballus* can be traced back to an animal having five toes on each foot, which lived in the early tertiary period. From this starting point palæontology demonstrates a succession of species each, as it were, gradually dispensing with the toes on both sides of the middle digit, till, ultimately, the latter alone remained, as is the case with the horse of the present day. The undoubted object of this remarkable specialization of the middle toe was to secure greater speed; but, as the highest limits of perfection were soon reached on this line of development, the horse must now be regarded as a *terminal form of life*. In fact, Nature has inveigled this noble solipede into a *cul de sac* from which it required human intelligence to extricate it—a remark which will be referred to later on. *Pari passu* with these transition stages in the development of the horse since Eocene times, there has been a gradual increase in the size of successive species. The genus *Hipparion* was widely represented in Europe, Asia, and America during Pliocene times; but from this point, probably owing to geological changes, the development of the subsequent horses of the Old and

New Worlds seems to have been independent of each other. Palæontological researches show that on the American continent they continued to flourish abundantly in Quaternary times, as, according to Sir Charles Lyell (*Principles of Geology*, 11th ed., Vol. II, p. 340), remains of no less than twelve species referred to seven genera have been discovered in the Pliocene and Pleistocene formations of that country; but to what extent they resembled, or differed from, those of the Old World I am unable to say. This is a most interesting point in the evolutionary history of the horse, and one which I should like to see handled by some competent palæontologist. To find, however, an exact parallelism in the development of these animals on both sides of the Atlantic would not at all surprise me, because, since the days of the *Hipparion*, there was only one outlet by following which higher efficiency could be attained on the natural lines of horse-development. These lines have been followed, and, for a time, the results were successful. As to the ultimate fate of these American horses the following remarks by Flower and Lyddeker (*Mammals Living and Extinct*, 1891, p. 381) may be quoted with advantage:

“Fossil remains of horses are found abundantly in deposits of the most recent geological age in almost every part in America, from Eschscholtz Bay in the north to Patagonia in the south. In that continent, however, they became quite extinct, and no horses, either wild or domesticated, existed there at the time of the Spanish conquest, which is the more remarkable, as, when introduced from Europe, the horses that ran wild proved by their rapid multiplication on the plains of South America and Texas that the climate, food, and other circumstances were highly favourable for their existence. The former great abundance of *Equidæ* in America, their complete extinction, and their perfect acclimatization when reintroduced by man, form a curious but as yet unsolved problem in geographical distribution.”

As to the causes which led to the extinction of the American horses, I believe a satisfactory explanation will be found in the fact that, after coming to the end of their evolutionary tether in the attainment of speed—the sole means by which they could escape from their enemies—they fell an easy prey to one or more of these enemies, who, meanwhile, had succeeded in improving

their methods of warfare in the struggle of life. Possibly these same victorious enemies may have, in their turn, met with a just retribution, as in devouring the horses—probably their only means of subsistence—they were erecting their own gallows.

Professor Owen has shown (*British Fossil Mammals*) that the fossil remains of the horse, found in ossiferous caverns and Post-Pliocene deposits of Europe, indicate two species. One (*Equus caballus*) was as large as a middle sized horse of the present day; and the other (*Equus plicidens*) was of the size of a large ass, but differing from the former, as well as from the modern horse, in the more complex foliations of the enamel on its molar teeth. The "fossil horse," he writes, "had a larger head than the domesticated races; resembling in this respect the wild horses of Asia described by Pallas." Also, after stating that several of the equine teeth from Kent's cavern indicated a large horse, he adds, "but the size of the fossil species would be incorrectly estimated from the teeth alone." Of the correctness of these statements by Professor Owen and their agreement with subsequent observations derived from different sources, we shall afterwards have an opportunity of judging. On the other hand, Cuvier and other naturalists declared their inability to detect any specific difference between the fossil horses of Quaternary times and *Equus caballus*. According to their views, all the differences that had been observed could be accounted for by a difference in the size of the animals compared.

#### *Horses of the Palæolithic Period in Europe.*

During the Quaternary period wild horses were indigenous to Europe and formed no small portion of the food of its human inhabitants, as well as of some of the larger carnivorous animals which then also inhabited the country. The evidential materials on which this statement is founded are so ample that it will be unnecessary to refer to more than a few selected examples.

Dr. Buckland (*Reliquiæ Diluvianæ*, 1824, pp. 1-47)

includes the horse among the twenty-three species of animals identified among the bones found in Kirkdale Cave, Yorkshire, but its remains are few in comparison with those of some of the others represented, such as the hyæna, tiger, bear, wolf, elephant, rhinoceros, hippopotamus, ox, deer, etc. Remains of the hyæna, representing from 200 to 300 individuals, were most abundant; and next to them came those of the ox and three species of deer. From such evidence Dr. Buckland came to the conclusion that the cave was the den of hyænas; and, as no complete skeleton of any of the larger animals had been found, he inferred that the hyænas carried their food piecemeal into the cave.

My next example is the well known station of Kent's Cavern, near Torquay, which differs from the former in having been a habitation of man, as well as a retreat for carnivorous animals. Among the animal remains found in this cave, those of the cave-bear, cave-lion, rhinoceros, bison, stag, and reindeer are stated to be abundant; while those of the hyæna and horse are characterized as very abundant. The copiousness of the bones of the horse is probably accounted for by the fact that the animal was most successfully hunted by the human troglodytes who were also in the habit of introducing the produce of the chase into the cave. The implements, tools, and weapons collected, in addition to the food refuse, prove that man's sojourn in Kent's Cavern was of long duration, though not continuous.

From a table published by Professor Boyd Dawkins (*Cave Hunting*, pp. 360-361) of the Pleistocene animals living to the north of the Alps and the Pyrenees, it appears that remains of the horse were found in thirty-one of the forty stations tabulated.

The Palæolithic caverns of Belgium have been so well explored, and the results so systematically arranged, that the anatomical facts bearing on the present inquiry can be mastered with the greatest ease. From a series of tabular statements by M. E. Dupont, published in his special work on the subject (*L'Homme pendant les Âges de la Pierre dans les Environs de Dinant-sur-Meuse*), I have compiled the accompanying abstracts of the prevailing fauna represented in seven of the Belgian caves with

which worked flints and other relics of man were associated.

The most abundant animals represented.	Mammoth Period.					Reindeer Period.	
	Trou du Sureau. 14 Species.	Trou Magrite. 26 Species.	Caverne du Goyet 3rd lev.l. 23 Species.	Do. 2nd lev.l. 17 Species.	Do. 1st level. 18 Species.	Trou de Chaleux. 25 Species.	Trou des Nutons. 27 Species.
Reindeer ....	10	30	20	4	11	3	5
Rhinoceros ....	4	8	4	2	2	—	—
Mammoth....	1	3	7	2	3	—	—
Horse ....	7	17	18	25	14	56	5
Hyæna ....	8	4	12	7	5	—	—
Cave bear ...	45	5	26	20	9	—	—
Fox ....	10	11	3	6	3	16	30
Goat ....	—	10	2	2	11	6	15
Ox (small size) ....	—	5	1 ?	3	2	15	2
Wild boar....	—	3	—	2	2	5	35
Lemming ....	—	—	—	—	—	60	6

From an inspection of the above statements it will be seen that the horse was one of the most common animals among the cave-fauna, both during the mammoth and reindeer periods; and, as its remains must have been dragged into the caves either by man or one of the great carnivores, it is clear that horses were then numerous in Belgium.

The station of Solutré in the commune of Macon (Saône et Loire) was an open air encampment, having a fine exposure to the south and sheltered on the north by a steep ridge. The remains of the settlement, covering an area of about 10,000 square metres, are situated just beyond the limits of the cultivated land, and within a short distance of a good spring of water. The site has been partially excavated by MM. Ferry, Arcelin,

Ducrost, Lortet and others, the results of which are published in a number of memoirs, one of the most accessible being that in the Norwich volume of the International Congress of Prehistoric Archæology (1868). The stage of civilization here disclosed was characterized by great perfection in the art of manufacturing flint implements, especially spearheads in the form of a laurel leaf, and by the abundance of horses and reindeer which then inhabited the country. Human occupancy was indicated by a number of hearths, around which characteristic implements of flint and reindeer-horn were found. The surrounding *debris* consisted almost entirely of broken bones, chiefly those of the horse and reindeer, evidently the remains of animals that had been used as food by the occupants. Encircling the south side the bones of horses were amassed in such an enormous quantity as to form a kind of protective wall to the settlement. According to MM. Ferry and Arcelin, a cubic mètre of this osseous *magma* contained 40 entire canon bones of the horse, and on this basis they calculated the number of individuals represented in the entire mass at 2,122. Others, however, estimated them at a much higher figure, Professor Toussaint, of the Veterinary School at Lyon, bringing the total up to 100,000 at least.

Of the fauna identified at Solutré, besides the horse and reindeer, the following may be mentioned as evidence of the palæolithic character of the station:—*Elephas primigenius* (portions of tusks, teeth, and bones in considerable quantity scattered throughout the *debris*); *Bos primigenius* (fragments of bones scattered about the hearths); *Cervus Canadensis* (formerly taken for *megaceros*) was identified by M. Dupont, who had frequently found remains of this animal in the Belgian caves; *Ursus arctos* (a tooth and some rib-fragments); *Ursus spelæus*, *Canis lupus*, *Canis vulpes*, *Hyaena spelæa*, etc.

Throughout a portion of the area within the settlement (and also outside of it) there were some human burials, the bodies lying sometimes immediately over the hearths, but generally at various depths in the *debris*. Here all the materials were greatly disturbed, pottery and



palæolithic implements being so intermingled that at first it was thought the burials were those of the primary occupants of the station; but subsequent research showed that they were of comparatively recent date, probably of Merovingian times. It is unnecessary to say any more on the archæological phase of this station, as it is only with its remarkable accumulation of horse bones that we are at present concerned. The bones were so broken for extracting the marrow that it was with difficulty a complete skeleton could be constructed for the museum at Lyon.

According to M. Toussaint the horse of Solutré was of low stature, the average height being from 1·36 mètres to 1·38 mètres. The lower jaws were highly developed, and the teeth were so large that they might readily pass as belonging to animals of much greater size. This relatively large size of the head in proportion to the rest of the body is in striking agreement, as we shall afterwards see, with the engraved figures of horses found in some of the Dordogne caves. The bones of the limbs were strong with large articulations, prominent muscular attachments, and broad hoofs. One noteworthy peculiarity of the leg bones, specially referred to by M. G. de Mortillet (*Le Préhistorique*, p. 383), is that the metacarpal and metatarsal vestigial bones were not united to the main bone, as is the case with modern horses—thus establishing an intermediate link between the latter and the *Hipparion*.

In the reports (*Reliquiæ Aquitanicæ*) of the investigations conducted by MM. Lartet and Christy in the caves of the Vezère (Dordogne), the fauna are not so fully described as to show the relative number of the different species. On p. 172, M. E. Lartet enumerates the animals whose bones were found in greatest abundance in the caves of La Madelaine, Laugerie, and Les Eyzies; from which it will be seen that *Equus caballus* heads the list, followed by *Sus scrofa*, *Cervus tarandus*, *C. elaphus*, *C. capreolus*, *Megaceros hibernicus*, etc. but, of course, this may not be the order of their relative abundance. On p. 181, M. Lartet gives lists of the mammalia identified from among the osseous remains found in seven caves of the Vezère, and all of them,

except one, contained remains of the horse. The same author states (p. 94) with regard to the fauna represented in the rock-shelter of Cro-Magnon:—"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." We may, therefore, safely conclude that during the reindeer period the horse was by no means a scarce inhabitant of the south-west regions of France.

But, *en revanche* for the deficiency in our knowledge of the fauna of the Dordogne caves we have, in the handicraft products of their inhabitants, another source of information, *viz.* a series of representations of animals (evidently those with which they were familiar in their hunting expeditions) engraved on fragments of bone, ivory, or stone; or, sometimes, sculptured out of bone, or reindeer horn. Since the investigations of MM. Lartet and Christy, similar drawings and sculptures have come to light from a number of other caves throughout France and Switzerland, the whole now culminating in a collection of over 300 specimens illustrating the social life of the period, more especially animals and hunting scenes, the former being portrayed with singular fidelity and artistic skill. Among the animals represented in this remarkable art gallery the horse takes a prominent place. Numerous illustrations of horses, chiefly from La Madelaine, engraved on reindeer horns or bones, are given in *Reliquiæ Aquitanicæ* (B. Pl. II, VI-VII, IX-X, XIX-XX, XXIV, and XXX-XXXI), all of which unmistakably represent big-headed animals (Pl. I, Fig. 1), with the exception of one or two which show a small head, sharp muzzle, and long ears. The outlines of a horse (Pl. I, Fig. 2), engraved on a piece of reindeer-horn found in the Kesslerloch cave, near Schaffhausen, and figured by Mr. Konrad Merk (*Excavations at the Kesslerloch*, 1876, p. 50 and Figs. 66, 68, and 70), also show a small-headed animal. It is thus described by Mr. Merk: "The well-formed head—rather long, with small ears—the upright mane, the graceful, well-formed body, the elegant and lightly-formed feet, and especially the remarkably thin tail, reaching nearly to the ground,

represent without doubt a young well-bred animal." This Kesslerloch horse must, therefore, have been a very different animal from the clumsy rough pony, with its shaggy tail and big ugly-looking head, figured on bones and horns from La Madelaine. M. G. de Mortillet suggested (*Matériaux*, 1867, p. 210) that there might have been also a race of horses with very long ears.

These indications of the existence of at least two kinds of horses during the reindeer period, thus brought before us by the art products of the native hunters, as well as by the osseous remains of the actual animals, have been further elucidated by the recent discovery of large engravings, and even coloured paintings, of various animals, on the walls of some newly explored caves in the south of France, more especially those of Combarelles and Font-de-Gaune, both situated in the Commune of Tayac (Dordogne), and within a short distance of the celebrated station of Les Eyzies. Obscure indications of this kind of art had been observed, as early as 1875, in the cave of Altamira, near Santander, in the north-east of Spain. Subsequently, and at various intervals, more decided examples were notified in the caves of Chabot (Gard), La Mouthe (Dordogne), and Pair-non-Pair (Gironde), in all of which figures of horse-like animals occurred, associated with those of other animals regarded as characteristic of the Palæolithic period.

With regard to these earlier discoveries, I have only space for a short notice of two horse-figures engraved on the walls of the cave of La Mouthe (*Bull. de la Soc. d'Anthropologie*, 3rd June, 1st July, 4th and 18th November, 1897; 19th October, 1899; and 17th October, 1901). The exploration of this cave has been conducted by M. E. Rivière, at various periods since 1895, with the happiest results. It seems that about fifty years previously the cave, then presenting an open recess facing south and extending some 12 mètres inwards, had been formed into a kind of store-room by building a wall in front, leaving only a door for access. Its contents, said to contain decayed bones and flint implements, had been utilized as manure. In April, 1895, it was ascertained, for the first time, that the cave was not limited to the space occupied by the store-room,

as on clearing out a small portion of the *debris* still remaining at its inner end a semi-circular opening 0.37 m. in height and 0.62 m. in breadth was discovered. This passage led into wider expansions for some 220 m.

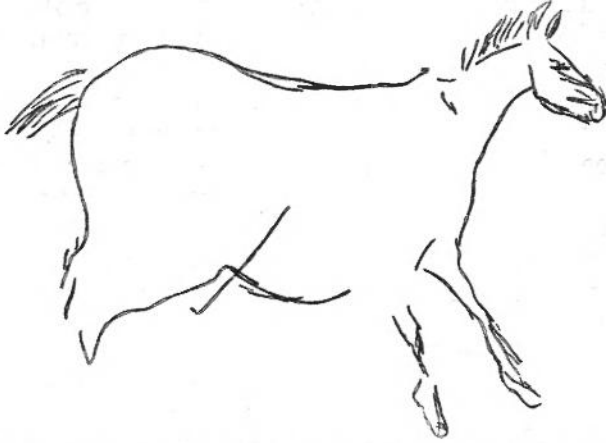


FIG. 1.—SKETCH OF HORSE ENGRAVED ON THE WALL OF THE GROTTÉ DE LA MOUTHE.

further. It was on the walls of this inner portion that the engravings now under consideration were detected. On the 17th October, 1901, M. Rivière laid before the Anthropological Society correct drawings of some of these wall decorations, clearly representing the following



FIG. 2.—HEAD OF A HORSE. (GROTTÉ DE LA MOUTHE.)

animals, *viz.* bison, *bovidæ*, reindeer, goat, mammoth and two *equidæ*. The figures of these horses were incised on a panel 128 m. from the entrance. The first (Fig. 1) represents an animal with a small head, slender

neck, and well-formed fore-quarters; but the posterior half is heavy and altogether out of proportion. The other (Fig. 2) has a stout neck, a long head directed almost vertically, and a hairy chin. Whatever may have been the defects of the artists, the originals of these two drawings must have been very different animals.

At the outset some doubts were expressed with regard to the authenticity of these rock-engravings, but M. Rivière has successfully dispelled all misgivings on this score by showing, among other evidence, that the figures were partly covered by the *debris* accumulated in the cave: "Cependant ils se prolongeaient aussi sous l'argile rouge qui constitue le sol de la grotte, à partir d'une certaine distance de l'entrée, et dont le niveau supérieur dépasse généralement l'extrémité des pattes des animaux gravés." (*Bulletins*, Vol. VIII, 4th Series, p. 314.) M. Rivière has also shown that the cave had been occupied by man both in the Palæolithic and Neolithic periods, the two strata being separated "par une stalagmite plus ou moins épaisse." Among the Neolithic *debris* were fragments of coarse pottery, and bones of various animals, including the horse, stag, and a small-sized ox.

On the 16th September, 1901, MM. Capitan and Breuil submitted a joint note to the Paris Academy of Sciences on "A New Cave with Wall Engravings of the Palæolithic Epoch." This was followed, a week later (23rd September), by a second note by the same explorers on "A New Cave with Painted Wall Figures of the Palæolithic Epoch." A noteworthy distinction in the art illustrations of these two caves is that the one (Combarelles) has its walls adorned, almost exclusively, with engravings cut more or less deeply, and the other (Font-de-Gaune) with paintings in ochre and black, or sometimes only in one colour forming real silhouettes of the animals thus depicted.

The total number of figures in the painted cave (Font-de-Gaune) is 77: aurochs, 49; indeterminate animals, 11; reindeer, 4; stag, 1; *equidæ*, 2; antelopes, 3; mammoth, 2; geometrical ornaments, 3; scalariform signs, 2. As, however, these paintings are not yet published we can

form no opinion on the special character of the two *equidæ* included in the above list. On the other hand, some of the engravings in the cave of Combarelles have been carefully copied and published (*Academie des Sciences de Paris*, Dec. 9, 1901; *Revue de l'École d'Anthropologie*, Jan. 1902); and as they seem to me to have an important bearing, not only on the question of the different kinds of horses, but also on that of their domestication, I shall examine the evidence with some care.

The cave of Combarelles, supposed to be the dried bed of a former subterranean stream, extends, in the form of a serpentine tunnel, to 234 m. in length, with an average breadth of 1 to 2 m.; and a height of 1.60 to 1.75 m. Only exceptionally does the height reach, or go beyond, 2 m., but sometimes it sinks so low that one has to creep to get along. The floor and roof are occasionally so much encrusted with stalagmitic deposits as to modify the original height considerably, but the walls are rarely covered with more than a film, which, in some parts, is absent altogether. The engravings begin at a distance of 118 m. from the entrance and are continued, on both sides, with only slight intervals, for 100 m. to within a few yards of the terminal end of the cavern. The average breadth of these tableaux is 1.50 m. When the reduced drawings were completed and extended on paper they formed a band 12 m. in length and 10 to 12 cm. in breadth. The lines delineating some of the figures are incised up to a maximum depth of 5 to 6 mm., and over them the stalagmitic film sometimes attains such a thickness as to completely mask the design. On the other hand, the incised lines are occasionally made more conspicuous by the addition of a thin band of black paint, as seen in Fig. 3. The figures represent animals in various attitudes, and the style, as well as the manner of execution of the designs, strongly reminds one of the reindeer hunters of La Madelaine and other stations of the later Palæolithic period.

The total number of animals outlined, so far as they could be distinctly made out, is 109: animals entire but not identified, 19; *equidæ*, 23; *bovidæ*, 3; bison, 2; reindeer, 3; mammoth, 14; heads of goats, 3; heads of antelopes, 4; heads of various animals, chiefly horses, 36;

human face, 1(?); cup mark, 1. These engravings betray so much artistic skill, precision of details, and knowledge of animal life, that MM. Capitan and Breuil regard them as precise documents in Palæontology. *Equidæ* being the most frequent of all animals figured in this cave, no less than 40 illustrations representing at least two species having already been accurately deciphered, archæologists will be greatly interested to know what the explorers regard as the differential characters of these two species of horses. As this point is important I will quote their exact words :

“ On peut nettement distinguer au moins deux espèces très différentes. Les uns sont de gros chevaux, à crinière ordinairement droite, à queue très fournie, à grosse tête et nez busqué avec lèvres très fortes.

“ D'autres sont beaucoup plus élancés, plus fins ; la tête est petite, la crinière, également droite et courte, arrive jusque sur la tête qui est notablement plus petite, le nez paraît bien plus droit que chez les précédents, enfin la queue est implantée tantôt plus bas, tantôt au contraire plus haut, comme celle des bovidés ; elle est glabre, souvent terminée par une touffe de poils.”

Since the characters of the two kinds of horses, as described in the above extract, are in keeping with the more or less precise evidence to the same effect gathered from other stations of the same period they may be at once accepted as correct.

The above epitome of the results of the investigations of ossiferous caverns, and other analogous deposits, sufficiently proves that horses were very abundant in Britain and Central Europe during the Quaternary period, and that they formed no inconsiderable portion of the food of the people of those regions. The geographical area thus surveyed might have been extended so as to embrace the Iberian peninsula, Eastern Europe, Asia Minor, the regions around the Caspian Sea, as well as other parts of Asia ; but it would be merely adding to the premises without strengthening the conclusions founded on them. It may be here noted that the horse was not an inhabitant of Scandinavia in Palæolithic, or early Neolithic, times, as no remains of this animal have been found in the kjökkenmoddings or peat-bogs of Denmark.

*The Supposed Domestication of Horses in Palæolithic Times.*

The next problem which claims attention is the supposed domestication of horses during the later portion of the Palæolithic period. The evidence on this question has such wide ramifications that to treat it empirically would be to trifle with a most interesting series of anatomical and archæological observations which have to be considered before any opinion could be formed on the subject; and for this reason we have to look a little afield.

Ossiferous caverns, from the point of view of their contents, may be divided into two categories, according as they show evidence of having been inhabited by man, or by carnivorous animals, especially the hyæna. In those days man and the hyæna had many common traits in their *modus vivendi*. Both were cave-dwellers. Both preyed on the animal world around them, and when successful in the chase they carried the carcass, or, if too large, portions of it, into their respective retreats. Both were fond of juicy bones, and, to secure the marrow, they broke them. But although they had common objects, their methods of procedure were very different. The hyæna broke bones with his powerful jaws and teeth, and consumed all the spongy and cartilaginous portions, leaving nothing but marrowless fragments. One feature in the process is of some interest, *viz.* that in gnawing certain bones they were always treated by this carnivore in a uniform manner. Dr. Buckland has shown that the residuary part of the lower extremity of the tibia of an ox, given to a Cape hyæna in Wombwell's menagerie, in 1822, was precisely similar to portions of the corresponding bones found in Kirkdale Cave (*Reliquiæ Diluvianæ*, Pl. XXIII). On the other hand, man broke bones also in a uniform manner by means of stone implements, which implements are often found among the *debris*. Human occupancy can thus be distinguished, not only by the presence of the stone hammers and the manner in which the bones were broken, but by the fact that the general refuse heap often contained some of the



weapons used in the chase; the tools by which these weapons were manufactured; the remains of the hearths at which the troglodytes cooked their food, and around which they practised their marvellous art instincts, etc. The human hunter, when he had to deal with big game, cut up the carcass by detaching the limbs, head, and sometimes a portion of the body; and these he transported to his home. The spine portion appears to have been generally left on the field, as vertebræ are seldom found among the ossiferous *debris* in caves. M. Dupont, after the manner so successfully adopted by M. Steenstrup with regard to the mammalian bones of the kjökkenmøddings, constructed drawings of the skeleton of a horse and a bear, showing in colour the bones or portions of bones found in caves inhabited by man (*Congrès International, etc.*, 1872, Pl. 76 and 77). Another peculiarity of osseous remains, when treated by human carnivores, was that the spongy and cartilaginous portions were not removed, thus presenting a marked contrast to those encountered in the den of the hyæna, and in the kjökkenmøddings. With regard to the latter M. Steenstrup proved, by an ingenious chain of acute observation and deductive reasoning, that the people who formed these refuse heaps were in possession of domestic dogs, which treated the refuse bones much in the same way as the hyæna. Now, as the bones in the Belgian caves inhabited by man were not so treated, we may safely conclude that there were no domestic dogs in those days, at least in that part of Europe. M. Dupont (*Les Temps Préhistoriques en Belgique*, p. 173) makes a curious point with regard to the frequency with which certain caudal vertebræ of the horse were met with. He observes that out of 157 of these bones found in the Trou de Chaleux, 18 were those of the first 4 vertebræ, while 139 were pretty equally distributed among the remaining 9 (the caudal vertebræ of the horse being 13 in number). From these data he infers that the hippophagous hunters were in the habit of cutting off the tails of the captured animals between the fourth and fifth vertebræ and carrying them away, probably as trophies of the

chase, just as the modern huntsman prizes the brush of a fox. The object of all these circumlocutionary details is to show that the horse was hunted and dealt with, when captured, precisely like other wild animals, such as the bear, which has never yet been tamed, and that, consequently, the animal was not then in a state of domestication. This deduction seems to me to be founded on particularly sound evidence; but yet there is considerable difficulty in accepting it as final.

I have already directed attention to the extraordinary abundance of bones of horses and reindeer at Solutrè. Now, with regard to the reindeer, though the most useful of all animals of the period to man, it was observed that only the bones of the limbs, head, etc. were represented in the *debris*; while, as regards the horse, those of the entire skeleton were generally present, thus proving that the latter animal was killed in the vicinity of the station, and not on the hunting ground. On this exceptional condition of the horse-remains at Solutrè, Prof. Toussaint, in a paper communicated to the French Association for the Advancement of Sciences, held at Lyon in 1873, maintained that the original owners of these bones had been reared in a state of domestication. In support of this theory he stated that the bones indicated few old and still fewer young horses, most of them being from five to seven years of age. But this fact M. Piètrément (*Les Chevaux dans les Temps Préhistoriques et Historiques*, p. 94) regarded as most convincing evidence against domestication; because in a troop of wild horses it was always the most vigorous adults which occupied the post of danger in the rear, so as to protect the younger and weaker, and hence they were most liable to be caught. Moreover, if these horses were really domesticated and simply reared to be slaughtered as required, it was not necessary to keep them for seven years. At the end of three or four years, the animal was fully developed, and more suitable for food than at a more advanced age. In opposition to M. Toussaint's argument, based on the presence of the spinal vertebræ—the very absence of which in other stations was the chief argument in support of their non-domestication—there is also something to be said. It has been suggested

that, in a district where horses evidently flourished in great numbers, the animals were frequently trapped and caught alive, and being easily cowed, could be readily led to the station by a halter or bridle, so that it was unnecessary to kill them on the hunting ground. Also, M. Carl Vogt (*Bull. de l'Institut Gènevois*, 1869) holds that, without the assistance of the domestic dog, it would be impossible to keep a herd of reindeer or a troop of horses together. But the dog is not among the animals represented by the osseous remains of Solutré.

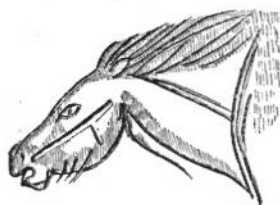


FIG. 3.—HORSE HEAD WITH INDICATIONS OF A BRIDLE (1).

I now come to discuss the evidence recently advanced by MM. Capitan and Breuil, in favour of the domestication theory, from certain characters and markings observed by them on some of the engravings of horses in the cave of Combarelles. The subject is so important that I must again quote their own words :—

“Plusieurs des équidés figurés présentent des caractères de domestication très nets. Le grand équidé reproduit (Fig. 4), porte sur le dos, comme on le voit facilement, une large couverture avec ornements en forme de dents. Un autre porte également une

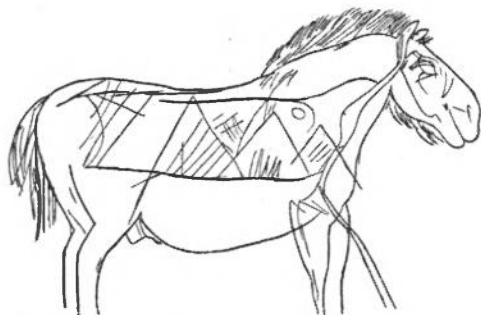


FIG. 4.—ENGRAVING OF A HORSE WITH A SUPPOSED COVER (1).

couverture très nettement représentée. Il en est autour du museau desquels il semble qu'il existe une corde, enfin un des trois petits chevaux du groupe ci-dessus (Fig. 5) indiqué porte—ainsi qu'on peut le voir sur la figure, qui reproduit la tête de cet animal au tiers de grandeur naturelle (Fig. 3)—un chevêtre indiqué avec une précision telle qu'il n'y a pas d'erreur possible. Enfin deux animaux portent sur le milieu du corps des signes nettement tracés; sur le flanc d'un

cheval il existe un signe en losange, et un autre animal, qui semble avoir des cornes, porte sur le flanc trois signes qui ont un aspect alphabétique (Fig. 5).

“Il est impossible de ne pas rapprocher cette particularité des figurations grecques archaïques de chevaux portant un nom gravé sur les fesses.

“Il paraît bien vraisemblable qu’il s’agit sur nos bêtes de marques de propriété ou de marques de tribus comme les Wasms en usage chez tous les nomades du Sud algérien.” (*Rev. de l’École d’Anthropologie*, p. 39.)



FIG. 5.—SKETCH OF A PORTION OF THE WALL OF COMBARELLES SHOWING DIFFERENT ANIMALS. (About  $\frac{1}{2}$  natural size.)

The evidence here adduced in support of the theory that these figures represent horses in a state of domestication is, in my humble opinion, by no means so conclusive as the explorers appear to imagine. It is founded on the supposition that some of the animals are represented as bridled and draped with some kind of ornamental covering; and that other animal figures are marked with well-defined characters, which may possibly turn out to be letters of an alphabet! In face of what has already been said on the probability of the horses of Solutrè having been trapped or lassoed, and so cowed in their capture as to be readily led to the hunter’s abode, I hesitate to accept these arguments as proof of domestication, at least in the sense in which the term is now used. The wild horses of South America, when lassoed, are quickly tamed there and then by the application of more or less violent measures. If professed horse-tamers of the present day can bring the most spirited and intractable animal into a state of abject docility in a few minutes, why should these wild hunters not do the same? And if they did, what scene could be more reminiscent of success in the chase, or more appropriate to adorn the walls of their sombre retreats, than a captured, subdued, and bridled horse? Moreover, it is difficult to conceive what useful purpose domestic horses

could serve in a community in which hunting was the main source of existence. Had they been utilized for riding we would undoubtedly, ere now, have had an equestrian representation of the fact, either among the varied assortment of objects in the palæolithic art gallery, or among the scenes of animal life, so fortuitously brought to light in the caves of Combarelles, La Mouthe, and others. The supposed horse-cover represented by Fig. 4 may be nothing more than the hunter's skin coat thrown over the back of the animal, when led home by means of a halter made of thongs or withes to be there slaughtered. But seeing we have as yet only a preliminary instalment of these most interesting art productions, it is better to postpone further criticism until all the materials are issued.

The history of the Quaternary horses of the Old World is differentiated from that of their contemporary congeners in the New World by the fact that the former lived in a country where human intelligence was becoming a dominant factor in the organic world. The outcome of man's experience of the many excellent qualities of horses, whether gained during his early hunting scenes, or subsequently, was to enlist the services of these useful animals in the cause of human civilization by bringing them into a permanent state of domestication. The far-reaching consequences of this friendly alliance are now so manifest that the very idea of eliminating the co-operation of horses from human affairs would be like sapping the foundations of a building. As a *quid pro quo* for wild liberty, the horse has received a guarantee of the indefinite prolongation of its existence as a species. In consequence of this new lease of life the geographical range of the numerous breeds of domestic horses is now almost coextensive with that of man himself. On the other hand, there is every reason to believe that, without the fostering care and protection of man, the Old World horses would, ere now, have met with a fate similar to that which overtook those of the New World. As to the time when horses became permanently domesticated, there are different opinions held. Some archæologists, as I have just explained, assign it to the Quaternary hunters of Europe.

Others maintain that the horses of the Palæolithic period gradually died out in Europe, and that the country was restocked in the Neolithic period by immigrants who imported domestic horses, along with the other domestic animals, from eastern regions. But these questions fall more naturally to be discussed in the next section, which deals with horses in Neolithic times.

### *Horses of the Neolithic Period in Europe.*

In following the footsteps of the horse through the Neolithic period in Europe we have to deal with a remarkable transformation, not only as regards the climate, flora, and fauna of the country, but in the *modus vivendi* of man himself. It is difficult to account for the precise cosmical conditions which in Quaternary times led to the intermingling, on the same geographical area, of such different animals as the mammoth, hippopotamus, rhinoceros, Irish elk, cave-bear, hyæna, reindeer, horse, etc. But whatever may have been the explanation, whether interglacial genial periods, or great extremes of temperature in the summers and winters, it is certain that subsequent climatal alterations taxed the life-capacity of these strangely assorted animals to a degree which ultimately became unbearable. As the glacial period passed away the climate became ameliorated and more humid, a change indicated by the prevalence of fruit trees, cereals, and herbaceous growths. Coincident with these physical changes in Britain and Central Europe there was a general dispersal of the characteristic fauna of the Palæolithic period. Some betook themselves to more congenial climates, according as they inherited northern or southern proclivities, while a third group disappeared altogether off the stage of life. Nor were the consequent changes in the ways and means of human economy less radical. We have just had one or two glimpses of the old troglodyte-hunters of France, armed with weapons of stone and horn with which they hunted the reindeer, horse, and other wild animals. They manufactured fine needles of bone with which they sewed their skin garments. They were fond of ornament, and adorned their persons with a variety of beads and

pendants made of teeth and coloured pebbles. They were skilful artists, and they have left behind them a collection of engravings and sculptures which bear a favourable comparison with analogous productions of the present day. But of agricultural operations, the rearing of domestic animals, the principles of religion, and the arts of spinning, weaving, and making pottery, they appear to have been absolutely ignorant. On the other hand, the Neolithic inhabitants of the same regions cultivated fruits, wheat, barley, and other cereals; they reared in a state of domestication oxen, sheep, goats, pigs, horses, and dogs; they were skilled in the ceramic art and manufactured cloth by spinning and weaving wool and fibrous textures; they ground their stone implements and tools, so as to give them sharp cutting edges; in hunting wild animals they used the bow and arrows, the latter being tipped with a sharp piece of flint; they built houses both for the living and for the dead, and their religious ideas were highly developed. But of the artistic taste and skill of their predecessors they had not a vestige, and whatever they did, by way of ornament, consisted of a few linear scratches arranged in some simple geometrical figures. The fundamental principles of these two civilizations are so incompatible that the Neolithic in its most flourishing stage, such as we see it among the Lake dwellers of Switzerland, cannot be regarded as a local derivation from the latest phase of the Palæolithic, without the application of some strong moulding influences of external origin. The former had therefore its birth and early growth in outside areas, and it is quite probable that, while the isolated reindeer hunters of Central Europe were still in existence, people elsewhere were already passing through the evolutionary stages which connected the two civilizations to the common stem line of human progress, and enabled an increasing population to live under the changed conditions of their environment.

For a long time archæologists could offer no better explanation of the striking contrast between the two civilizations than by supposing that they had been separated by a long interval of time—a *hiatus*—during which Western Europe ceased to be inhabited. But

this idea is now generally discarded, and already what seems to be a true epoch of transition has been disclosed by a number of investigations which show that the two races had come in contact, and become partly amalgamated. Such investigations can only be referred to here very briefly.

MM. Cartailhac and Boule (*La Grotte de Reilhac, Lyon, 1889*), inform us that the animals represented in the upper strata in the cave of Reilhac (*Causses du Lot*), viz. dog, horse, ox (*Bos taurus*), sheep, pig, roe and red deer, are precisely the same species as are to be found in stations of the Neolithic period. So also are those represented in the lower strata, with the exception of the reindeer and hyæna. But it is noteworthy that while the remains of the reindeer were relatively few, those of the stag were very abundant, so much so as to be considered the most characteristic animal of this cave. The contemporaneity of the hyæna was inferred from gnawed bones, which were met with only in the lowest portion of the *debris*. The osseous remains indicated two varieties of the horse, one large and the other small, but they showed no evidence of domestication. The complete disappearance of the arctic group of animals and the increasing abundance of remains of the stag, together with a corresponding scarcity of those of the reindeer, justified the explorers in dating the habitation of the cave of Reilhac to the very end of the Quaternary period.

In the rock-shelter of Mas-d'Azil (Ariège), M. Piette has described certain deposits (4 feet in depth), resting immediately on a stratum with relics characteristic of the Magdalenian, or latest Palæolithic period, but beneath another containing relics equally characteristic of the Neolithic period, which he regards as the *debris* of a transition period between the two civilizations. As I have elsewhere (*Prehistoric Problems, p. 60 et seq.*) given a short account of the evidence adduced by M. Piette, it is unnecessary to enter here on the details, more than to mention the animals which the author regards as belonging to that period, viz. stag, wapiti, roebuck, chamois, ox, horse, wild boar, badger, beaver, wolf, common bear, rat, some birds, fishes, and snails.



Grains of wheat and a variety of seeds and fruit stones were also identified. Some of the relics were of novel types, such as barbed harpoons made of stag-horn, and water-worn pebbles of quartz or schist, some showing usage marks at one end, and others various devices painted on them with peroxide of iron.

In the station of Campigny (Seine Inférieure) remains of huts, coarse pottery, and bones of the ox, stag, and horse were found, thus showing a still nearer approach to Neolithic civilization (see *Revue de l'École d'Anthropologie*, December 15th, 1898). According to French archæologists its remains (as well as those from a number of other analogous stations) belong to the last phase of the transition period and are regarded as crude imitations of the industrial products of the Neolithic immigrants, before the two races became finally amalgamated.

On a former occasion (July 19th, 1898), in addressing the members of the Institute, I advanced some remarkable evidence on the continuity of human existence in Switzerland since Palæolithic times, founded on the discoveries and researches of Dr. Nuesch in the rock-shelter of Schweizersbild (see *Journal*, Vol. LV, pp. 259-285).

It will be observed that of the principal animals which figured in the hunting scenes of Palæolithic times, man and the horse are almost the only two that survived and manifested a feeble existence during the transition period in Western Europe. The reindeer, owing to the change in climate and the increase of forest growths, emigrated to more northern regions, whither it was followed, according to some writers, by a portion of the old hunting population. The individuals of this species which found their way into Britain, while the island was connected with the continent, were caught, however, in a trap by the intervention of the strait of Dover and instinctively receded northwards till they reached Caithness, where they became extinct only about the twelfth century. The place of the reindeer in Europe was taken up by the red-deer, which now began to be very numerous. The urus survived to historic times, but this animal does not appear to have been very abundant

at any time. The alterations in the physical and climatal conditions of Europe were also affecting the welfare of its indigenous horses, with the result that they also were receding more and more to the open and more congenial steppes of Asia, where a few of their descendants are said to survive to the present day. There are, however, potent reasons for supposing that, within the British Isles, and probably in some other parts of Europe, they actually became extinct for a short time during early Neolithic times, and that their reappearance in these countries was as domestic animals. While the remnant of the old hunters of the days of big game who still lived in France were struggling to adapt themselves to the new conditions of life, and to make a living on such of the smaller wild animals—probably greatly increased in numbers after the disappearance of the great carnivores—as found a congenial habitat in the mild climate and rich vegetation which then obtained, they came in contact with the Neolithic civilization which slowly reached them partly from Asia and partly from Mediterranean sources. The question which now arises is—Was the horse among the domestic animals of the indigenous people who had thus become pastoral and agricultural farmers? Or was it a later addition to the number of subjugated animals and imported through the Asiatic immigrants? The opinions held on this problem are somewhat contradictory; but the arguments, *pro et con*, are too discursive to be now fully dealt with. I shall therefore content myself by stating categorically the opinions of one or two of the leading authorities on the subject.

Rüttimeyer (*Die Fauna der Pfahlbauten in der Schweiz*, 1861, p. 122), expresses the opinion that the inhabitants of the earliest lake-dwellings were not in possession of the domestic horse. He contrasts the few horse bones found on some of the older sites, such as Wangen (a tooth), Moosseedorf (a metatarsal bone), Robenhausen (a tarsal bone), and Wauwyl (a few bones), with their abundance on the Bronze Age stations.

M. Dupont in discussing the fauna of the Neolithic period in Belgium says: "A number of species of the preceding age have emigrated. The reindeer and the

glutton have taken refuge in the polar regions ; the wild goat, chamois, and marmot, on the elevated mountains of Central Europe ; the antelope, saïga, and probably the horse, on the boundaries of Europe and Asia." (*Les Temps Préhistoriques en Belgique*, p. 216.)

On the other hand, M. Piétrement holds that the indigenous people of France—the direct descendants of those of Palæolithic times—as soon as they came under the influence and instruction of the dolmen-builders derived their domestic animals from the wild stocks of the country, among which he includes the horse. He contends that the domestic animals introduced by the Neolithic races—ox, sheep, goat, pig, dog, and horse—were not in sufficient numbers to supply the whole of Europe. The idea of domesticating animals would, therefore, according to this author, come into Western Europe through the incoming Neolithic people who hailed from eastern lands. (*Les Chevaux dans les Temps Préhistoriques et Historiques*, 1883, p. 134).

Professor Rolleston, F.R.S., having before him the results of Canon Greenwell's researches in the British barrows, makes the following statement :—

"I have never found the bones or teeth of a horse in a long barrow, and I would remark that, whilst such bones are very likely to be introduced into such barrows in the way of secondary interments, I have not met with any exact record as to the finding of them in surroundings which left no doubt as to their being contemporaneous with the primary interments. The bones of the horse are both durable and conspicuous, and it is difficult to think that if the Neolithic man had used the animal either for purposes of food or for those of carriage, as his predecessors and successors did, we should not have come upon abundant and unambiguous evidence of such use." (*British Barrows*, p. 736.)

Lord Avebury also gives expression to a similar opinion :—

"Remains of the horse are very rare in English barrows, and I know no well authenticated case of their occurrence in a long barrow. I have thought, therefore, that it might be of interest to point out the class of graves in which bones or teeth of horses were found. In Mr. Bateman's valuable works there are, altogether, twenty-eight cases, but of these, nine were in tumuli which had been previously opened, and in one case no body was found. Of the remaining eighteen, five were tumuli containing iron, and seven were accompanied with bronze. In one more case, that of the 'Liffs,' it is doubtful whether the barrow had not been disturbed.

Of the remaining six tumuli, two contained beautiful drinking vessels, of a very well marked type, certainly in use during the Bronze age, if not peculiar to it; and in both these instances, as well as in a third, the interment was accompanied by burnt human bones, suggestive of dreadful rites. Even, however, if these cases cannot be referred to the Bronze age, we still see that out of the two hundred and ninety-seven interments only sixty-three contained metal, or about twenty-one per cent., while out of the eighteen cases of horses' remains, twelve, or about sixty-six per cent., certainly belonged to the metallic period. This seems to be *prima facie* evidence that the horse was very rare, if not altogether unknown, in England during the Stone age. Both the horse and bull appear to have been sacrificed at graves during later times, and probably formed part of the funeral feast. The teeth of oxen are so common in tumuli, that they are even said by Mr. Bateman to be 'uniformly found with the more ancient interments.'" (*Prehistoric Times*, 4th ed., p. 174.)

Professor Boyd Dawkins thus writes :—

"From this outline it is clear the domestic animals were not domesticated in Europe, but that they had already been under the care of man probably for long ages in some other region. The turf-hog, the Celtic short-horn, the sheep, and the goat must have been domesticated in the countries in which their wild ancestors were captured by the hunter in Central Asia. To this region also belong the jackal, the wild boar, and the wild horse, and in ancient times the urus. It is therefore probable that all these domestic animals came into Europe with their masters from the south-east—from the Central Plateau of Asia—the ancient home of all the present European peoples." (*Early Man in Britain*, 1880, p. 300.)

Before coming to any decision on these conflicting opinions it will be as well to inquire if the historical annals can throw any further light on the problems at issue.

#### *Historical Evidence on the Domestication of the Horse.*

That no representation of horses is to be found on any of the monuments of the Nile valley, prior to the eighteenth dynasty, seems to have been overlooked by Egyptologists till the year 1869, when Professor Owen, in the course of a visit to the country, drew attention to it (see Lenormant, *Les Premières Civilisations*, Vol. II, p. 299). However that may be, the fact is of great significance, and quite in harmony with a passage in Genesis (chap. xlvii, v. 17), where we are informed that Joseph, then administrator of the country, gave the people "bread in exchange for horses, etc." As the

invaders, known as Hyksos or Shepherds, entered Egypt from the north, it is probable that they first introduced the domestic horse into the Nile valley, but, being a simple pastoral people, and not given to erecting monuments, they left little evidence of their presence in the country, though they are said to have governed it for 500 years. That the Shepherd Kings were in power during the time of Joseph seems almost certain from the instructions given by him to his brethren, as to what they should say when they came before Pharaoh, "Ye shall say, Thy servants' trade hath been about cattle from our youth even until now, both we, and also our fathers: that ye may dwell in the land of Goshen; for every shepherd is an abomination unto the Egyptians." (Genesis, chap. xlii, v. 34.) At a later period Egyptian horses became famous, as we find King Solomon not only using them exclusively for his army and household, but also importing them for the neighbouring kings of the Hittites and Syria. Also, in pictorial representations of battles on monuments of the eighteenth dynasty and onwards, war-chariots drawn by a couple of prancing steeds play a conspicuous part.

In Greece, the earliest indications of domestic horses are the sculptured war-chariots on the famous tombstones at Mycenæ, which cannot be dated later than 1200 B.C. Though the Mycenæan chariots have only four spokes in their wheels, while those on the Egyptian monuments have six, they have otherwise so many elements in common as to suggest that the early Greeks derived their knowledge of horses, either direct from Egypt, or through the Semitic peoples of Asia Minor. According to Schrader (*Prehistoric Antiquities of the Aryans*, 1890, p. 260) the art of riding was practised neither by the Greeks of Homer nor by the Hindus of the Rigveda. This use of the animal he supposes to have originated with Turko-Tartaric races. The terms for riding in the Indo-European languages not only differ from one another, but are apparently of recent date. There seems to be no doubt, if we can depend on the deductions of philologists, that the primitive Aryans were acquainted with the horse, but whether the animal was domesticated or wild it is difficult to say. There is

no evidence to show that they used horses for riding or driving, but they may have bred them for food.

From Cæsar we learn that another branch of the Celtic people, *viz.* those inhabiting Britain, made use of war-chariots, a custom which probably reached them during the "Late Celtic" period, though, strange to say, the author makes no mention of this mode of fighting among the Gauls. Livy, however, informs us (X, 28-29) that the Gauls had one thousand chariots in their army at the battle of Sentinum (295 B.C.). That the Celts of the early La Tène period in France and Switzerland used war-chariots is proved by the discovery of several sepulchral tumuli containing the remains of a warrior associated with a chariot, horses, and military accoutrements. Similar interments have also been occasionally met with in British barrows of the "Late Celtic" period (*Prehistoric Scotland*, p. 133). From an incidental remark in Cæsar (*Alexandrian War*, chap. 75), it appears that the soldiers of Pharnaces, King of Pontus, used scythed chariots at the battle of Zela. Herodotus (V, 9), says of the horses of the Sigynnæ that they "are shaggy all over the body, to five fingers in depth of hair: they are small, flat-nosed, and unable to carry men; but when yoked to chariots they are very fleet, therefore the natives drive chariots." It has also been shown, both from monumental and linguistic evidence, that the domestication of the horse has long been established among the Persians, Assyrians, and Semites.

To what extent and in what regions wild horses survived to historic times it is difficult to determine. According to Herodotus (IV, 52), wild white horses grazed on the shores of a vast lake in Scythia, from which the Hipanis flows. Pliny (VIII, 16), in his description of the animals of the north, mentions herds of wild horses; and Strabo (III, iv, 15, and IV, vi, 10), records their existence in Spain and the Alps. But these, as well as the reported herds of wild horses in Asia in the present day, may have been domestic animals which had escaped and reverted to a wild condition.

In contrasting the early distribution of the horse with

that of the ass. I find that, while the former was imported into Egypt some eighteen hundred years before the Christian era, the latter was known from time immemorial, not only throughout the Nile valley but also in Palestine, Assyria, and probably elsewhere in Asia. As a riding animal for persons of distinction it is represented on an Egyptian monument of the fifth dynasty, some 5000 B.C. In the Book of Genesis wealth is always computed by so many heads of camels, asses, sheep, and oxen. In Homer the ass is only once mentioned, and it is not considered to have been domesticated at that time in Greece. It seems, therefore, that while the line of distribution of the horse was from north to south, that of the ass was in a contrary direction. Both animals, however, found their way into Western Europe in a state of domestication probably about the same time. From the historical point of view everything points to the fact that one or more of our domestic horses emanated from Central Asia.

#### *Concluding Remarks.*

After careful consideration of the bearing of the above facts and opinions on the problem of the domestication of the horse I still find it difficult to formulate very precise conclusions on the subject. During the interval between the latest phase of the Palæolithic, and the most flourishing of the Neolithic, civilization, horses became greatly diminished in number throughout Europe; and it is now almost impossible to determine whether the few horse remains recorded during that period belonged to a domestic or wild breed. In these circumstances the following general statements can only be regarded as tentative and problematical:

(1) At least two species of *equidæ* were contemporary with man during the Palæolithic period in Western Europe, and formed a considerable portion of his aliment; but whether these horses were latterly in a state of domestication is a controverted problem. In face of the evidence now advanced by MM. Capitan and Breuil in favour of the domestication theory, it

may be advantageous to recall M. Steenstrup's opinion on the origin of the domestic animals. After examining the osseous remains of the ox, goat, and pig found in the Belgian caverns associated with those of the mammoth and reindeer, the Danish *savant* maintained that they presented no special osteological characters by which they could be differentiated from those of the corresponding domestic animals of Neolithic times. Hence he argued that either the domestication of these animals must be relegated back to the Palæolithic period, or the Palæolithic period must be much more recent than is generally supposed (*Congrès International, etc.*, 1872, p. 212 *et seq.*). In connection with this point it may be observed (see table, p. 114), that the small species of ox and the wild pig became prominent among the European fauna only towards the close of the Palæolithic period (Reindeer period of Dupont), and that the sheep, which is probably of eastern origin, scarcely appears among deposits of human food refuse till the most flourishing stage of the Neolithic civilization.

(2) When dealing with the problem of the domestication of animals, based on the archæological materials collected during the Swiss lake-dwelling researches, I thus expressed my views :

“ That continued attention was paid to the rearing and breeding of domesticated animals during the Bronze age is attested by their osseous remains, which have been critically examined by such competent authorities as Rütimeyer, Studer, Uhlmann, and others. While the lake-dwellers of the earlier Stone age had only as domestic animals one small species of dog, a small ox, a horned sheep, and the goat, we find that towards the end of this period and during the succeeding Bronze age not only new and large breeds were developed, but another was added to the list, *viz.* the horse. From the remains of the domestic horse found at Moeringen and elsewhere it appears to have been a small and slender-limbed animal with small hoofs, and altogether much inferior to the wild horse as hunted and eaten by the cave men of Palæolithic times, from which it is supposed to have been a direct descendant. When the Aar canal was being excavated the bones of the smaller or domestic horse were found associated with bronze objects in no less than nine different localities, all of which agree with the above characteristics. The horse of the *terremare*, according to Professor Strobel, presents the same characters as that of the Swiss lake-dwellings, and as we have already seen from the bridle-bits and other horse trappings, there can be no doubt it was also in a state of domestication. I may also mention that a skull found at Auvernier was believed



by Rüttimeyer, after most careful deliberation, to be that of the ass. Professor Strobel has also recognized the osseous remains of the ass in the terremare. (*Bulletino di Pal. It. An. VIII.*) The sheep diverged considerably from its earlier form, and lost much of its goat-like appearance, being now larger, and developed into various breeds. Still more varied were the breeds of cattle, especially in the vicinity of the lakes of Biemme and Neuchatel. The *Bos primigenius* appears to have been tamed and crossed with the earlier type, giving rise to a variety of breeds, such as *trococeros* and *frontosus*, one of which had wide branching horns, as is proved from its remains found at Concise, Chevroux, Locras, etc. The small dog of the Stone age (*Canis domesticus palustris*, Rut.) gave place to a much larger kind, somewhat resembling our modern greyhound. The domestic pig also appears to have passed through various evolutionary phases: but the wild boar still retained its individuality intact. Dr. Uhlmann, in his report on the osseous remains from the Grosser Hafner at Zurich, describes three varieties of the pig, as well as three of cattle." (*Lake Dwellings of Europe*, p. 535.)

(3) Seeing, therefore, that wild stocks of the ox, goat, pig, horse, and dog, from which the corresponding domestic animals could have been derived, did exist in Europe in pre-Neolithic times, there seems to be no inherent improbability in the idea that some of them had been domesticated by the indigenous inhabitants prior to the incoming of the Neolithic brachycephals into France. There is, indeed, every reason to believe that while the early Lake-dwellers—probably among the first of these eastern immigrants—were constructing their lacustrine habitations, the Dolmen-builders were already in possession of the whole of Western Europe and living under a Neolithic civilization derived from sources altogether independent of the Aryan brachycephals. If this be so, then we must considerably modify the view hitherto upheld by archaeologists, viz. that the culture and civilization of the Neolithic age were exclusively introduced into Europe by the successive waves of so-called Aryans from Asia. That, however, these immigrants reared animals in a state of domestication which were originally derived from Asiatic wild species is probable, as it satisfactorily accounts for the numerous breeds and varieties of domestic animals which subsequently obtained among European nationalities.

(4) But, it may be asked, who were these Dolmen-builders? According to the best of my judgment they

were mainly the descendants of the first Palæolithic inhabitants, who entered Europe, along with a batch of African animals, when the country was connected with North Africa by at least two extensive land tracts, one through Italy, Sicily, and Tunis, and the other across the Strait of Gibraltar. These people lived ever since in various selected localities throughout Europe, during which the country passed through some striking changes in climate and in the geographical distribution of land. The disappearance of the Euro-African land bridges across the Mediterranean was an important physical event, as it cut off a southern retreat to both men and animals. But, like migratory birds who instinctively follow the lines of old land routes, though long obliterated by intervening seas, these "Eurafrican" peoples kept up their original sources of relationship until the art of navigation facilitated better means of intercourse. As the herds of wild horses and reindeer, and other animals, on which the Palæolithic hunters chiefly depended for their living, gradually died out, necessity compelled them to find other means of subsistence. In the regions to the north of the Pyrenees, owing to the continued survival of their favourite animals in this part of France, long after they disappeared elsewhere in Europe, these Palæolithic hunters existed as isolated groups till they became absorbed among people possibly belonging to their own race, who meantime had adapted themselves to the Neolithic methods and customs which reached them from Mediterranean sources of culture. In the extreme west of Europe we find in the kitchen-middens of Mûgem, in the valley of the Tagus, evidence of a people, probably as old as the reindeer hunters of France, who lived largely on shell-fish. According to M. Ribeiro (*Congrès International*, etc., 1880, p. 287) they did not possess any of the domestic animals, but yet, among their food refuse, bones of the following genera were identified: *Bos*, *Cervus*, *Ovis*, *Equus*, *Sus*, *Canis*, *Felis*, etc. Professor Sergi's hypothesis of a "Mediterranean race" seems to me to offer the best solution of the ethnological problems of Western Europe.

(5) As I have elsewhere discussed the ethnology of

Britain (*Prehistoric Scotland*, Chap. XII) - it is unnecessary now to say more than that the primary Dolmen-builders of the British Isles belonged to the same dolichocephalic "Iberian," or "Mediterranean," race just mentioned above. It would also appear, according to the opinion of the most competent archæologists, that the horse was not among their domestic animals until the Bronze age; but whether the animal was then domesticated from a still surviving indigenous wild stock, or imported from the continent by the first Celtic immigrants, there is no available evidence to show. Since then the frequency with which broken horse bones are found in the later tumuli, and among the food refuse on Roman and Romano-British sites, proves that horseflesh was largely utilized as food by the inhabitants of Britain until it was forbidden by the Church, in the latter part of the eighth century, because it was eaten by the Scandinavian people in honour of Odin. It appears, however, that the deeply rooted prejudice against the use of the horse as a source of human food, which prevails in modern times, was only gradually acquired; as it is recorded (see *Cave Hunting*, p. 133) that the Monks of St. Gall not only ate horseflesh in the eleventh century, but returned thanks for it in a metrical grace as follows:

"Sit feralis equi caro dulcis sub cruce Christi."

The wild horses here referred to, and others mentioned in early chronicles, are supposed to have been domestic animals which escaped and reverted to a semi-wild condition. How long the British people continued to disregard the prohibitive epistles against the use of horseflesh issued by Popes Gregory III. and Zacharias I., it is, of course, impossible to say. (See Geoffroy Saint-Hilaire, *Lettres sur les Substances Alimentaires et particulièrement sur la Viande de Cheval*, Paris, 1856.) Bones belonging to a large and small kind of horse were identified by Professor Rolleston among some animal remains sent to him from the crannog of Llangorse Lake. The same authority identified the shoulder blade of a small horse among the contents of a box of bones from the Lochlee crannog. According to Dr. Traquair,

F.R.S., the horse was scantily represented in a collection of bones from the Elie kitchen-midden, the date of which was otherwise ascertained to be the seventh or eighth century. (*Proc. Soc. Antiq. Scot.*, Vol. XXXV, pp. 281-300.) It would thus appear that the presence of remains of the horse in any of the food-refuse heaps, so often found associated with early inhabited sites in Britain, such as crannogs, hill-forts, motes, etc., has a certain chronological value in dating that particular habitation to a period not later than the twelfth century.