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“Man and the Mammoth: being an Account of the Animals found Associated with Early Man in Pre-historic Times.” By Henry Woodward, F.G.S., F.Z.S., of the British Museum.

HAVING a short time since drawn up a brief statement of the evidences upon which the presumed antiquity of the human race in Western Europe is based, and also some account of the animals found associated with early man in this region, I have ventured to think it may be found of sufficient interest to lay before this Society.

It is based only in a very small part upon my own observations, being chiefly composed of materials gathered from the published labours of my friends and colleagues, who have specially devoted their time and energies to these researches.

The question of primeval man and his contemporaries is now, by common consent, admitted to be one of the most important geological topics which has occupied the attention, not only of men of science, but also of the educated classes generally, in the present day, and notwithstanding the works already published, it may be said that the public mind is still craving for fuller information.

Nor need that craving remain altogether unrelieved, for every month contributes its quota to the general store of published facts and discoveries, and we may ourselves add thereto by careful obser-

uations in our own district if we only know how, when, and where to observe for ourselves.

The class of deposits which have yielded the evidence of which I am about to speak, cannot be said to have been altogether previously unnoticed, but it is only during the past ten years that the painstaking, careful investigations of such men as Prestwich, Falconer, Lubbock, Lartet, Christy, Pengelly, Evans, Boyd-Dawkins, Sanford, Dupont, and others of the same high stamp, have resulted in the real discoveries and vast additions to our knowledge of this last chapter of geological history heretofore unwritten, and in which Man and the Mammoth take part.

Let us for a moment retrace the course of these events. So long ago as 1823, that distinguished British geologist, Dr. Buckland, published his celebrated work, the "*Reliquiæ Diluvianæ*," in which he described the organic remains contained in ossiferous caverns and fissures, and "diluvial gravel" in various parts of Europe. But the Dean, although so acute a geologist, concluded that none of the stone implements or human remains met with in these deposits could be considered to be as old as the Mammoth and other extinct and foreign animals, with the bones and teeth of which they were associated.

So little was the study of Geology then understood, that the idea of any remains of man being found in deposits older than those attributed to the Noachian deluge was rejected as contrary to Scripture, and generally received opinion.

At this early period, however, 1824, the late Rev. Dr. John Fleming, F.R.S.E., at that time a minister in the Scotch Presbyterian Church, (afterwards Professor of Natural Philosophy in Aberdeen, and latterly Professor of Natural History at New College, Edinburgh,) contributed an article to the "*Edinburgh Philosophical Journal*," vol. xi., 1824, "On the Influence of Society on the Distribution of British Animals," in which he ably argued against the views of Dr. Buckland, and showed (even from the then comparatively scanty evidences) that there was incontestible proof of the contemporaneity of the human and animal relics found associated together in these cave-deposits, and that they were clearly the remains of the former denizens of the same region, entombed in

their present burial places by similar causes to those now in action, and not by any wide-sweeping catastrophe, such as was assumed by the advocates of a universal deluge.

There was (1824-5) a highly intelligent Roman Catholic Priest living at Torquay, the Rev. J. McEnery, who, having examined a certain cavern, known as "Kent's Hole," discovered flint implements of undoubted human workmanship associated with bones of the Mammoth, the tichorhine Rhinoceros, cave-bear, and other mammalia, about the contemporaneity of which he does not seem to have doubted, and the correctness of his views have been now well-established by subsequent investigation.

The next (1833-4) earliest systematic work of exploration we find was carried out in the valley of the Meuse, Belgium, by the late Dr. Schmerling, of Liège, who carefully searched for and exhumed the fossil human and animal remains buried together in the ossiferous caverns around Liège, an account of forty of which he published, with figures and descriptions of their buried contents.

In 1841 M. Boucher de Perthes commenced to collect, and, in 1847, to publish the result of his researches in the gravel-deposits of the valley of the Somme, around Abbeville, and the sight of his collection of flint-implements induced Dr. Rigollot to search the gravel-pits around Amiens, which also yielded singular proofs of prehistoric man. Notwithstanding the publication of these discoveries, however, public interest was not as yet aroused, and the French savans of Paris only laughed at Monsieur de Perthes and his researches.

Meanwhile English geologists were accumulating facts and material, which only needed some fresh motive force to give it vitality and importance, and it came at last after long years of waiting.

To the late Dr. Hugh Falconer, F.R.S., we no doubt owe the initiation of a new era in the investigation of ossiferous deposits. For, although Mr. Trimmer, Mr. Godwin-Austen, Mr. Prestwich, and many other good geologists were at work long before this period, it was the systematic exploration of the Brixham cave, near Torquay (commenced in 1858), which first excited public attention to this interesting branch of geological inquiry, and set in motion similar explorations in France, Spain, Belgium, Italy, Malta, and elsewhere.

Added to this, we became aware of those remarkable discoveries made by Prof. Keller and others of ancient Lake-habitations in Switzerland, somewhat resembling the Crannoges of the Irish Lakes (now mostly buried in peat-bogs, which have filled up these ancient fresh waters).

At the same time, our countryman, Mr. Henry Christy (then fresh from his Mexican travels), brought home to us not only the contents of the French caves, but also those of the Danish peat-mosses and refuse-heaps, thus adding new interest to the investigation of pre-historic man.

Nor have these varied materials been allowed to remain as idle curiosities in our Museums, to be objects of marvel or conjecture; on the contrary, they have been subjected to the most severe investigation by the best and ablest among our archæologists and geologists, and, like the vision described by the prophet Ezekiel (xxxvii.), we have seen the dry and mouldering remains of these ancient inhabitants of our island arise; we have seen the animals they followed in the chase, the weapons which they used, the ornaments they wore, and have even learned a good deal concerning the rude arts they practised. Nor is this all we have gained, for we can now compare each fresh discovery with such a series of recorded precedents, spread over such wide areas of explored country, that we can refer each find to one or other of a series of stages representing periods in the history of these ancient races, which, although not reducible to years, or even centuries, yet are capable of being dealt with in chronological sequence, just as the earlier deposits have been arranged by geologists long since.

The evidences of the remote antiquity of man are derived from various sources :—

1. The ancient quaternary river-gravel deposits.
 2. The ossiferous caverns and rock shelters.
 3. The shell-mounds or refuse heaps of Denmark, the Orkneys, the Welsh coast, etc., etc.
 4. The Danish peat-mosses.
 5. The Irish lakes and peat-bogs (crannoges).
 6. The Swiss pile-works, or *Pfahlbauten*.
1. The first of these is, undoubtedly, of the most ancient character ;

but is also (as might naturally be expected) of the most meagre and restricted kind, chiefly consisting of flint implements of rude and simple form, and with but little variety of pattern. No authentic instance of human remains associated with these flint weapons is recorded; but, after the most careful investigation of these deposits by Messrs. Prestwich, Evans, Falconer, and a number of other undoubted authorities, whose judgment may well be relied upon, the following conclusions were arrived at:—1st. That the flint implements are the result of design, and the work of man. 2ndly. That they are found in beds of gravel, sand, and clay, which have never been artificially disturbed. 3rdly. That they occur associated with the remains of land, freshwater, and marine testacea, of species now living, and most of them still common in the same neighbourhood, and also with the remains of various mammalia, a few of the species now living, but more of extinct forms. 4thly. That the period at which their entombment took place was *subsequent* to the Boulder-clay period, and to that extent Post-glacial; and also that it was among the latest in geological time—one apparently immediately anterior to the surface assuming its present form, so far as it regards some of the minor features.¹

It is hardly needful to point out to you the regions included in this first division. The valley of the Waveney at Hoxne, Suffolk, where flint implements were found in the year 1800 by Mr. Frere. (*Archæologia* for 1800, vol. xiii., p. 206.) The Ouse at Bedford, where Mr. Jas. Wyatt has found flint implements and remains of Elephant, Rhinoceros, Hippopotamus, etc. The Thames-valley high level gravel, where, in an excavation in Gray's Inn-lane, London, a flint weapon associated with the skeleton of an Elephant, was found so long ago as 1715; at Fisherton, near Salisbury; in the Trent, not far from Nottingham; in the Vale of Pickering, the Somme, the Seine, the Rhine, the Val' d' Arno, and many other localities.

2. The ossiferous caverns and rock-shelters have long been known, but not systematically explored until ten years since. Their contents, as might have been expected, are more rich and varied, and they have given us a greater insight into the state of civilization of their ancient

¹ Falconer, *Paleontological Memoirs*, 1868. Vol. II. p. 598.

occupants than almost any other. The British localities are in Devon and Somerset, near Torquay and Brixham, and in the Mendip Hills; the promontory of Gower in South Wales, where eight caves have been carefully explored by Colonel Wood and the late Dr. Falconer; the Coygan Cave, near Laugharne, Carmarthenshire, partially explored by Mr. Henry Hicks, of St. David's. (See *GEOL. MAG.*, vol. IV., page 307, 1867.) The historical cave of Kirkdale, rendered famous by Dr. Buckland's researches. The Caves of Liege and of the Valley of the Lesse in Belgium; of the Vezere, the Dordogne, and the Aveyron in France, explored by Schmerling, Dupont, Lartet and Christy, the Vicomte de Lastie, the Comte de Vibray, and many others. Rich as is the fauna revealed by our English Caves, they cannot be compared for one instant as regards the human remains and works of art which the French Caves have made known to us, I say, advisedly, *works of art*, for we have now ample materials in this country even to show the wonderful ingenuity and skill displayed by the ancient Aquitanians in the fabrication of needles, weapons of the chase, both in wood and stone, swords made of reindeer horn, ornaments in the same material; and, lastly, in depicting the animals they knew living around them.¹

The time forbids me to enter upon an account of the Shell-mounds and Danish Peat Mosses; nor of the Irish Peat-bogs and Swiss Pile-works, each of which would form a chapter by itself. On the contrary, I shall, by your permission, occupy your attention with a brief account of the fauna of the Pre-historic period generally, as revealed to us in the various superficial deposits included in what is now generally termed the Quaternary epoch.

In the accompanying Table I have endeavoured to show the species of animals found in association with early man, as evidenced by his weapons in one set of deposits, and by his osseous remains

¹ Those interested in these researches, who have not yet personally inspected the rich collection of Pre-historic remains, so admirably arranged and displayed in the Ethnological department of the British Museum, and the Christy Collection (exhibited on Fridays,—admission by ticket, obtainable gratis any day at the British Museum), under the able direction of A. W. Franks, Esq., F.R.S., F.S.A., F.G.S.,—should take the first occasion to do so, and they will find themselves well repaid by seeing probably the best collection extant of works of early and savage man from all countries.

and handiwork in another. I have also introduced certain other species (those whose names are enclosed in square brackets) whose remains are not found with man, but in a somewhat older set of deposits, containing, however, some of the animals common to the Pre-historic epoch. Those names of species *not enclosed in square brackets*, are again divisible into—I. Animals known to man, but now extinct. II. Animals whose geographical distribution has been changed. III. Animals which have been exterminated by man; and, IV. Animals still indigenous to Britain and the neighbouring continent.

TABLE OF ANIMALS CHARACTERISTIC OF THE PLIOCENE AND QUATERNARY
DEPOSITS OF BRITAIN, FRANCE, AND BELGIUM.

<i>Castor Europæus</i> , Owen.....	...	K	<i>Ovis aries</i> , Linn.....	...	L
„ [Trogontherium, Fischer] X	...		<i>Cervus elaphus</i> , Linn. ....	...	L
<i>Mus musculus</i> , Owen .....	...	L	„ <i>capreolus</i> , Linn. ....	...	L
<i>Arvicola amphibia</i> , Owen.....	...	L	„ <i>tarandus</i> , Linn.	M	
„ <i>agrestis</i> , Fleming.....	...	L	„ [Sedgwickii, Gunn] X		
„ <i>pratensis</i> , Owen.....	...	L	„ [Brownii, Dawk.] X		
<i>Spermophilus citillus</i> , Linn.....	M		„ <i>dama</i> , Linn.....	...	L
„ <i>erythrogonoides</i> , Falc. X			<i>Alces malchis</i> , Linn.....	M	
<i>Lagomys spelæus</i> , Owen.....	X		<i>Megaceros hibernicus</i> , Owen X		
<i>Lepus timidus</i> , Linn. ....	...	L	<i>Machairodus latidens</i> , Owen X		
„ <i>cuniculus</i> , Linn.....	...	L	<i>Felis spelæa</i> , Goldf.....	X M ²	
<i>Lemmus lemmus</i> , Linn.....	M		„ <i>antiqua</i> (?).....	X	
<i>Elephas primigenius</i> , Blum.....	X		„ <i>catus</i> , Owen.....	...	L
„ <i>antiquus</i> , Falconer.....	X		<i>Hyæna spelæa</i> , Goldf.....	X M ³	
„ [meridionalis, Nesti.] X			<i>Canis lupus</i> , Linn.	M K ⁴	
<i>Rhinoceros tichorhinus</i> , Cuv.....	X		„ <i>vulpes</i> , Briss.....	...	L
„ <i>leptorhinus</i> , Owen.....	X		<i>Lutra vulgaris</i> , Owen.....	...	L
„ <i>megarhinus</i> , Christol X			<i>Mustela martes</i> , Ray.....	...	L
„ [Etruscus, Falconer] X			„ <i>putorius</i> , Linn. ....	...	L
<i>Equus caballus</i> , Linn. ....	...	L	„ <i>ermineus</i> , Linn.	M	
<i>Sus scrofa, ferox</i> , Linn.....	M K ¹		<i>Meles taxus</i> , Owen.....	...	L
<i>Hippopotamus major</i> , Nesti.....	X		<i>Gulo luscus</i> , Linn.	M	
<i>Bison priscus</i> , Bojanus.....	...	K	<i>Ursus spelæus</i> , Blumenbach X		
<i>Bos primigenius</i> , Boj.....	X		„ <i>arctos</i> , Linn.	M	
„ <i>longifrons</i> , Owen.....	...	L	<i>Talpa europæa</i> , Schmerling .....	...	L
<i>Ovibos moschatus</i> , Pallas.....	M		<i>Sorex vulgaris</i> , Owen.....	...	L
<i>Capra hircus</i> , Linn.....	...	L	„ <i>moschatus</i> , Linn.....	...	L
„ <i>æagrus</i> , Gmel.....	...	L	<i>Saiga tartarica</i> , Pallas	M	

X = Extinct.

M = Migrated.

K = Killed.

L = Living.

Of the names in brackets I will not say much, merely observing that the Forest-bed of the Norfolk Coast has yielded a most wonderful

¹ The wild boar *Sus scrofa ferox* has been killed off in England, but is still found in France and elsewhere on the continent.

² *F. spelæa* is extinct, but if considered equivalent to *F. leo* it has migrated.

³ *Hyæna spelæa* is extinct, but if considered to be the same as *Hyæna crocuta*, it has migrated.

⁴ Killed off in Britain.

series of Pre-glacial forms, associated with many which lived on into the Post-glacial period, and were known to man.

The most remarkable, perhaps, are (1) the gigantic Beaver, *Castor Trogontherium*, which occurs in widely-separated localities, viz., the Norfolk Forest Bed, and in a sandy deposit on the borders of the sea of Azof. Dr. Schmerling also found its remains in the Caves of Liege. Another gigantic Beaver has lately been found in America, the *Castoroides Ohioensis*, Fost. (2.) A remarkable form of deer, *Cervus Sedgwickii*, which occurs in the Forest-bed, and is nearly allied to *Cervus dicranios* of the Italian Pliocene. (3.) Another species of deer, closely allied to the Fallow Deer, the *Cervus Brownii*, lately described by Mr. Boyd-Dawkins, now quite extinct, from the Pliocene deposit of Clacton, Essex. See Quart. Journ. Geol. Soc. 1868. Vol. xxiv., p. 511. Pl. xvii. and xviii. (4.) The *Elephas meridionalis*, common to the Forest-bed and the Val' d'Arno, in Italy—a form somewhat more like the African than the Indian species as regards the arrangement of the enamel-layers of its molar teeth. 5. The *Rhinoceros etruscus*, found in the Norfolk Forest-bed, and also in the Val' d'Arno.

Animals known to man, but now extinct.—I have always felt some hesitation in accepting the statement that the *Machairodus* existed down to the Pre-historic period; but its discovery by the late Rev. J. McEnery, in Kent's Hole, in 1825 (published by E. Vivian, Esq., 1859), having been confirmed by Mr. Pengelly, F.R.S., in 1867, (see British Association Reports, Dundee, 1867), there seems reason to believe that it may have lived on till the commencement of this period. Certainly this was the most remarkable of the contemporaries of early man, and probably his most formidable rival in the hunting-grounds of Western Europe. The sabre-toothed lion has only been met with in this one cave in England, but it also occurs in the district of Auvergne, in France, and in the Val' d'Arno, in Italy. The largest species of this carnivore is found at Buenos Ayres, on the La Plata.

Of the species of Bear which occur in the fossil state, two at least, the *Ursus spelæus* of our caves, and the *Ursus priscus* of the Gailenreuth cavern, have been considered as well-marked extinct forms. The

Bears are, perhaps, of all the carnivora, the most difficult to determine, on account of their mixed diet and their consequent variable dentition : they have been as widely distributed in times past, as in our own.¹

Of the Cervine family, one extinct species, the *Megaceros Hibernicus*, or Gigantic Irish Deer, deserves especial notice. This splendid animal was not by any means confined to Ireland, although it is quite possible that it may have lingered on in that country after it had been exterminated in Britain. There is a fine specimen of the entire skeleton of this animal in the British Museum. The size of this deer is immense, even when compared with our largest living species ; when erect, the topmost prong of his antlers was more than ten feet from the ground, and in breadth across they measured more than nine feet. The bones of the Irish deer occur in the beds of marl which underlie the peat-bogs, and they are generally very perfect, being stained more or less deeply by tannin or iron, and sometimes partially incrustated by pale blue phosphate of iron. Even the marrow of the bones occasionally remains in the state of a fatty substance, which will burn with a clear lambent flame. Groups of skeletons have been found crowded together in a small space, in a peat moss, with the skulls elevated and the antlers thrown back upon the shoulders, as if a herd of deer had fled for shelter or been driven into a morass and perished on the spot. Besides the numerous remains of this deer found in Ireland, its bones and horns have been obtained from Kent's Hole, the Forest-bed on the Norfolk coast, Kirkdale Cave, and numerous other localities.

Of the Oxen, the most ancient is the *Bos primigenius*. Professor Owen maintains the opinion that this gigantic ox (the *Urus* of Cæsar, which dwelt in the great Hercynian forest), was *never* tamed by the Britons or Romans, but was only an object of the chase. Its remains are alike common to the caves, the river-valley deposits, and the peat-bogs.

A grand head, and entire horn-cores, with a large proportion of the skeleton of *Bos primigenius*, was obtained from beneath the peat near

¹ The teeth of pigs, dogs, and bears, are all subject to considerable variation, owing to their mixed diet.

Cambridge. The peat had grown into and filled the cavities of the skull and all the bones. On the removal of the peat from the frontal bones, a *stone celt* was disclosed, broken off short in the forehead, which it had pierced, and had been apparently left there as useless by the hunter, to whose skill the mighty beast had fallen. The specimen is now in the Woodwardian Museum, Cambridge.

I was present at the disinterment of two magnificent pairs of horn-cores at Ilford, in the Brick-earth of the Thames valley, only a short time since. This species is readily distinguished from the Bison by the large size, length, and curvature of the horn-cores and by the form of the skull. *Bos primigenius* is found both in deposits with human remains, and in those anterior to man's era.

Of the *Elephants*, two forms, long confounded together, are now known to have been contemporary with man in Europe, viz., 1. *Elephas antiquus*, Falc., and 2. *Elephas primigenius*, Blum.

The former of these (*E. antiquus*) was long considered as identical with *E. primigenius*, but Dr. Falconer has shown that by the characters of the molar teeth they may be distinguished. 1st. By the narrowness of the tooth in proportion to its length and height. 2nd. By the great height of the plates, being twice that of the width of the crown. 3rd. Mesial rhomboidal expansion of disks of wear. 4th. Great crimping of the enamel plates.

The tusks of *E. antiquus* are nearly straight. The remains of this species are almost as widely distributed in our bone-caverns and River-valley gravels and Brick-earths, as are those of *E. primigenius*. No fewer than 2,000 elephants' grinders are recorded by my father, the late Mr. Samuel Woodward, as ascertained to have been dredged during a period of thirteen years upon the oyster-bed off Hasboro', on the Norfolk coast; "by far the largest number of these," says Dr. Falconer, "belong to *Elephas antiquus*."

Elephas primigenius (the "Mammoth," properly so called,) possesses unusual interest in connection with early man. Not only because it is one of those forms which, there is reason to believe, extended back into Pre-glacial times; but also because it is apparently brought so near our own day by the discoveries of entire bodies of this remarkable beast embedded in the frozen soil and ice

of the great rivers of Siberia and in Behring's Straits; no fewer than nine of which are on record. Its range in geographical area was equally great. It has been found in Ireland, Britain, through Europe, from the extreme north to the hills of Rome, and from France to the Ural Mountains, thence across Siberia into N. America, and southward to the Ohio, where its remains occur with those of the *Mastodon* in Big-bone-lick, Kentucky.

In October, 1864, I had the pleasure to visit Ilford, in Essex, and there see and examine the only existing cranium of *Elephas primigenius* with the tusk attached which has ever been obtained and preserved in this country. It is entirely owing to the skill and great practical judgment of Mr. W. Davies, of the Geological Department of the British Museum, that this fine fossil was ever raised from its matrix to adorn our National Museum.¹ No doubt hundreds of these remains have turned up in the valley of the Thames alone, but never before was the requisite skill brought to bear upon so unwieldy and friable a relic. The right tusk, which was found detached from the skull, measured ten feet ten inches, including the portion which in the left side is enclosed within the alveolus. From the top of the cranium to the end of the socket of the tusk is four feet. The circumference of the tusk, one foot from the socket, is twenty-six inches.

The three species of *Rhinoceros* are all extinct. Of the three—(1) *R. megarhinus*, or the great slender-limbed Rhinoceros, with largely-developed nasals, appears to be characteristic of the Norfolk Forest-bed and Grays Thurrock. It also occurs in France, associated with the *Mastodon brevirostris*, and in Italy with the *Mastodon arvernensis*. (2) *R. tichorhinus* and (3) *R. leptorhinus* are the two species common to the ossiferous deposits of our caverns, and they also are found together in the Brick-earth of Ilford. A unique skull (the only one known) of *Rhinoceros leptorhinus*, was obtained from the same brick-field at Ilford which yielded the Mammoth skull. We are indebted also to Mr. Davies for the preservation of this most valuable relic. All these Rhinoceri were *bicorn*, and resembled the Sumatran species. Like the Mammoth, the Rhinoceri had an enor-

¹ See GEOLOGICAL MAGAZINE, 1868, Vol. V., p. 540, Pl. XXII. and XXIII.

mously extended range in Pre-historic times. One of the earliest remains found in Russian Siberia, imbedded in ice, was an almost entire example of the great woolly *B. tichorhinus*, found in 1772 by Pallas, on the banks of a tributary of the Lena, lat. 64 degrees. This carcass emitted an odour like putrid flesh ; part of the skin was still covered with short, crisp wool, with black and grey hairs. The head and foot are preserved at St. Petersburg, in the Royal Museum.

Hippopotamus major.—As might be expected, the remains of the *Hippopotamus* are more frequently found in river-deposits than in caves. Yet this remark does not hold good in all cases. Remains have been found in one of the Gower Caves (Raven's Cliff), Durham Down Caves, in Kent's Hole near Torquay, Kirkdale, and other localities, but in the Grottoes of San Ciro and Maccagnone, in Sicily, the *Hippopotamus* remains formed by far the greater bulk. Many ship-loads of these interesting relics were quarried and sent to Marseilles and England to be used in sugar-refining! Professor Ferrara, who examined the remains, stated that the great mass belonged to two species of *Hippopotamus*. Those collected by Dr. Falconer are preserved in the British Museum, and identified with *H. major* and *H. Pentlandi*. It is abundantly distributed through our River-valley, gravel and Brick-earth deposits, and occurs from Yorkshire southwards through England, France, Belgium, Spain, Italy, etc.

From observations of the habits of the living animal (*H. amphibius*) in South Africa, we learn that, where undisturbed, it frequents with equal pleasure the coast as it does the rivers, and that north of Port Natal they not only swarm in the rivers but upon the sea-shore, re-creating to the sea when disturbed or attacked. Such evidence as this enables us to understand the presence, in Pre-historic times, of the *Hippopotamus* in Britain during the summer, even after this country had been isolated from the Continent, although this seems not to have been the case, until nearly the close of the Quaternary period.

A species of Marmot (the *Spermophilus erythrogenoides* of Falconer), and another Rodent (*Lagomys spelæus*), a species of tail-

less here, completes the list of extinct species contemporaneous with man. For, incredible as it may seem, it appears that after a careful investigation of the remains of *Felis spelæa*, the Cave-lion, Messrs. Boyd Dawkins and Sanford have concluded that it cannot be differentiated in *any way* whatever from the existing lion of Africa. And again that *Hyæna spelæa* is only a variety of *H. crocuta*, the great spotted Hyæna of S. Africa.

We now pass therefore to *Animals whose geographical distribution* has been changed. These we can analyze more fully than the extinct forms before enumerated; and they arrange themselves naturally into two divisions—those which have migrated north, and those which have migrated south.

The first division, as you will have anticipated, is by far the largest of the two, including nine species. The second consists of two only (the Cave-lion and Cave-hyæna already referred to).

Spermophilus citillus.—The “Pouched Marmot” is the first. Its remains have been found at Fisherton, the Mendip Caves, and elsewhere in England, and also in the Liege Caverns. It is still met with in northern and central Europe, near the snow-line.

The Lemming (also found at Fisherton, near Salisbury) is now represented in Lapland, Norway, Greenland, Siberia, and Arctic North America. Its migratory and gregarious habits have been ably described by Richardson and others.

Ovibos moschatus.—The “Musk-ox,” or “Musk-sheep,” possesses peculiar interest, as one of those generalized species still left us, which we were long at a loss where to place with certainty, whether with the Oxen or the Sheep. M. Lartet has shown, however, reason for placing it with the *Ovidæ* and *Capridæ*. The gravel of the Avon, the river-gravel near Maidenhead, and Green Street Green, in Kent, and the Crayford brick-pits, in the valley of the Thames, have all yielded examples of this animal. It has also been detected by M. Lartet in France. In Siberia its remains occur in the frozen mud of the great rivers, which yield the bodies of the Mammoth, along the whole line of the shores of the Polar Sea. Its living habitat is now the barren,

treeless wastes of the high northern latitudes of North America, and our Arctic voyagers have traced it and lived upon it so lately as 1856. Captain (now Sir Leopold) M'Clintock gives the following statistics of the Musk-ox in a paper read before the Royal Dublin Society, 25th January, 1857:—Musk-oxen on Melville Island, April 4 and May 13, saw 59 (shot two); third visit, July 1 to 19, saw 30 (shot two); Prince Patrick's Island, May 14 and June 26, saw 5 (shot three)—total seen, 94; number shot, seven. They were so unused to man's presence that, when one of a herd was shot, it was often difficult to induce the rest of the party to move off, so as to allow M'Clintock and his men to take possession of their fallen comrade. We cannot help contrasting this brave and noble sailor's conduct with that of the Laird of Lamont. M'Clintock observes, "We never killed more than we absolutely needed." Mr. Lamont, on the contrary, gives a list of walruses and other victims "*shot for pastime*," and left to render still more desolate with their decaying carcases these northern seas.

The "Saiga Antelope" deserves a word. It has lately been determined as occurring in the caves of France, with the reindeer, etc. An antelope is recorded as being found fossil, together with several species of deer, beaver, wild boar, etc., in shell-marl beneath peat, near Newbury, in Berkshire, by Dr. J. Collet, F.R.S., in 1757.—(Phil. Trans.) May not this also have been the Saiga antelope? It is now found to inhabit the eastern slopes of the Ural Mountains, and the shores of the Sea of Azof. On a small island a number were found living, so tame as to be undismayed at a discharge of fire-arms. It is to be seen alive in the Zoological Gardens. It is the only tapir-snouted antelope known.

Ursus arctos.—The "Brown Bear" occurs both in Britain and Ireland. Undoubted remains from Longford, in Ireland, and Manea Fen, Cambridgeshire, are preserved in the British Museum. It still lives in Russia. So lately as A.D. 1057 bears were natives of Scotland and Wales, and reckoned among the beasts of the chase, equal to the hare or the boar (Ray, Syn. Quad. p. 214).

Gulo luscus.—The "Wolverine," or "Glutton"—was once a native of this country, as its remains testify from the caverns of

Banwell, Bleadon, and Gower. It is still common in Siberia and North America, and is the pest of the fur-hunters of those countries.

Mustela erminea.—The “Ermine” is another of the Weasel tribe, now gone North-east, and over the Ural chain into Siberia.

Alces malchis.—The “Elk” has been met with in Scotland, at Chirdon Burn, beneath peat, in a similar deposit as the *Megaceros* in Ireland. A lower jaw also has been obtained from Llandebie Cave, in South Wales. It is the true Elk of Norway, or Moose-deer of the Canadians.

If we take into consideration the relative importance of the various animals to man in his hunter state, the whole list is probably surpassed by the Reindeer (*Cervus tarandus*). Not only do we find its remains in greater profusion than that of any other animal in those caves in which man undoubtedly resided, but his weapons were for the most part fabricated from its horns, bones, and sinews; and doubtless, his clothes were composed of its skin. The later investigations of Mr. Pengelly, at Torquay, have led to the discovery of similar barbed javelins of Reindeer horn to those of the French Caves. That fewer cut antlers have been found in England than in France, may be due to the more savage condition of the early Britons; but it cannot be attributed to lack of the reindeer. In Boscoe’s Den, Gower, South Wales, more than 1,000 antlers have been obtained by Colonel Wood; indeed, their remains are almost co-extensive with the cavern and river-valley and peat-deposits. It is reasonable to suppose that the reindeer may have retained a footing in Scotland even long after the Roman occupation of Britain; but it must have yielded, if living there, not only before the pursuit of the chase by man, but also before the overpowering influence of the red-deer, *Cervus elaphus*, and still more to the great change in physical conditions which affected our climate. That the reindeer could continue to live for long in Britain after its isolation from France, seems unlikely, for the migratory instincts were as strong in the race then as at the present day. The only change produced has been to modify the area which the migration formerly extended over. Instead of migrating southward in winter, from Norway and Denmark into France and Britain, they are not only

pressed northward by the great tide of human beings which has occupied their former territory, but also by the change in the thermometer. Vast as was the range of the reindeer in past times, we see how enormous is its kingdom in our own day. Through Northern Europe, Asia, and America, it occupies the area from the edge of the woods to the farthest northern latitude, crossing the frozen sea fearlessly in vast herds from land to land. Sir Leopold M'Clintock mentions seeing, on Melville Island, in April and May, on two visits, 29 head of reindeer, two of which he shot. In July, on two visits, he saw 74, and again shot one. On Prince Patrick's Island, in May and June, he saw eight, and shot five. On Emerald Island, in June, 13 head; being a total of 124 head seen in these three far northern islands, between 76° and 77° North lat.

When migrating in Siberia, says the Russian Admiral von Wrangel, the migrating body may consist of many thousand head of deer, and though they are divided into herds of some 200 or 300 each, yet they always keep so near as to form only one immense mass, sometimes 60 miles in length. In crossing the rivers they all follow the same route. They select a place where a dry valley leads down to the stream on one side and a flat sandy shore facilitates landing on the other. As each separate herd approaches the river, the deer draw more closely together, and the largest and strongest buck takes the lead. He advances, closely followed by a few of the others, with head erect, and apparently intent on examining the locality; having satisfied himself that all is right, he enters the river, the rest of the herd crowd in after him, and in a few minutes the surface is covered with them. It is doubtless due to casualties in these migrations that we owe some, if not all, of our reindeer bones in river-valley deposits. Detached antlers may easily be explained where they occur in quantities (as in the peninsula of Gower, in South Wales) by the annual shedding of the horns; but most of those from the Caves have a part of the skull attached to the burr of the horn. This is so in more than 50 from the Cave of Bruniquel, which have passed through my hands.

In many of the Caverns of Central and Southern France we have abundant evidence that the wild Horse was largely eaten by the

Cave-dwellers, and that its bones formed an important article for the fabrication of many of their weapons of the chase, and also for their needles. Remains of Horse are abundant in the Bruniquel Cave.

Of the animals now living, but become extinct in some regions, the Beaver—*Castor Europæus* (or *Castor fiber*? of Canada) from being killed by man is, probably, quite extinct in Europe. Only one refuge seems left to it by any chance, and that is the mouths of the Danube in the Euxine Sea, where its fossil congener is found. It was formerly abundant in our Welsh rivers, even at a late date, comparatively speaking. It was scarce in the 9th century, in the 12th it was only found in one river in Wales, and another in Scotland. There can be no doubt the Beaver was killed off the face of the land for the sake of his fur coat. His remains are abundant in the Cambridgeshire fens, and he did his best to divert the rivers and destroy the land for his own pleasure, but like other selfish pleasure-seekers, his would-be pools became peat, and in it are embedded the bones of the curious, ingenious, but destructive rodent, who aided the mischief.

In a single night, not long since, the Beaver at the Zoological Gardens diverted all the water of his pond, by the introduction of mud into his tank, and sent several dozen gallons of very dirty water over the gravel walk. He wanted to make a dam—failing which he made a mess!

The Lithuanian Bison—preserved by Imperial ukase of his Majesty the Emperor of all the Russias—once roamed the Prairies of Europe as his congener now does those of America. But he couldn't be tamed and made to plough like *B. longifrons* and *B. taurus*, and so the natives killed him off, and he would be soon extinct, like his old rival *primigenius*, but for the Emperor.

The wild boar and the wolf were only killed yesterday. The former (*Sus scrofa ferox*) abounded in Henry II.'s time, whilst the latter (*Canis lupus*) survived in Ireland till 1710. Blood-money was put upon his head as upon the tiger in India at the present day. The present foxes are mostly re-introduced, and owe their existence to *Protection*. The Wild-cat, Badger, Marten, Pole-cat, and even the

Otter, are becoming rare as British species. These all owe their extinction to man. The Red Deer, Roebuck, and Fallow Deer only exist by means of protective legislation.

Of birds, the Capercaillie, or "Cock of the Wood," is extinct with us, though still occurring in Norway. The two Bustards (*Otis tetrax*, the little bustard, *Otis tarda*, the great bustard), are both exterminated. Formerly they could live on the wastes of West Norfolk and Wiltshire. The great Crested Grebe—*Podiceps cristatus*, the great Bittern—*Botaurus stellaris*, and the freckled Heron, *Botaurus lentiginosa*, once rejoiced in the Fens of Cambridgeshire and Dorset. The fen-lands are gradually becoming drained and cultivated, and these birds are mostly dead. The White Spoon Bill (*Platalea leucorodia*), the White Stork (*Ciconia alba*), and the little Glossy Ibis (*Falcinella igneus*), once were summer visitants of ours, now they come no more. The Herons are fast dying out, and require "Protection" like the Grouse and Partridges. The Golden Eagle and numbers of *Falconidæ* and lesser birds of prey have also been lost.

Among the interesting associations of the past, to the Naturalist, will always be counted the Great Auk, once an inhabitant of the Orkneys and the shores of Denmark, found in the Kitchen-Middens of both, and also in the Indian Shell-heaps of New England. The last of his race is believed to have perished so lately as 1846. And no wonder! for the poor bird could not fly, so the old Danish sailors used to lay a plank from the ship to the shore, and compel their unfortunate victims to "Walk the plank," "single file," and fall into the ship's waist, where they were killed and eaten. One skipper boasted that he had brought off thirty boat-loads in an hour. Once this bird covered the shores of the north—Labrador, Nova Scotia, Newfoundland, Greenland, Iceland. Now we look in vain for a single one.

The Dutch sailors were just as merciless to the Dodo in the Mauritius, and the Maories to the *Dinornis* and the Great Rail in New Zealand, and the people of Madagascar to the *Epyornis*.

Changes (insensibly it may be, yet, nevertheless, surely) are going on year by year around us. We see but little in the lifetime of an

individual ; but the retrospect of a century shows vast changes in our condition as a race for example.

Each step in retrogression will appear more and more marked.

Go back a century, where are our railroads, our telegraphs, our steam-vessels, our rifled cannon ?

Still further, and we have not our colonies, and the world is only half-known.

Further still, and we have not learned Christianity, and worship idols ; we are ignorant, superstitious, and cruel. Still further, and behold the savage depending on the chase, trusting to his instincts to supply his wants. And now to ignorance, superstition, and cruelty, he has added dirt ; for he is not at all particular about his abode, provided he be dry, warm, and his hunger appeased. His life was not one constant state of alarm—indeed, he was happier in this respect than his black representative of to-day. The Negro lives in a stockaded village in terror. Why ? Because, although slavery is at an end in North America, it is not quite ended elsewhere ; and the cruel passions that ardent spirits and vice have engendered in the slave-trading population of the coast, seek gratification in acts of cruelty and violence, often of a far more terrible nature than any pre-historic savage would have invented.

There can be little doubt that the designation, “ *the noble savage*,” belongs almost entirely to the past. If we except the New Zealanders, the savage races of to-day are probably, as a whole, less civilised than the men of the French caves and the Swiss pile-works. Witness the Andaman Islander, the Terra del Fuegian, and the Australian native.

The old Cave-men represented the population of the less-civilised portions of the globe, as these aborigines do now in our own day ; for there never was a time in the Earth’s past history when a uniform condition of things obtained, unless in pre-Silurian epochs.

Faunas slowly but constantly migrate, a part becoming extinct, some races improving, some remaining persistent.

Peoples migrate—some are exterminated (witness the native races dying out before the over-mastering effects of a too-advanced white civilization)—the remainder in part improve (being, as individuals,

capable of improvement) those which remain unchanged, do so because they are not exposed to the elements of change.

There is little doubt that man has been upon the earth long enough to have witnessed many physical changes, and even considerable modifications in the climate of Europe. We can the more readily accept this, because from the brief portion of the record of our race embraced in the historic period, we know that many changes in physical conditions have come to pass, and some, indeed, are even now taking place around us.

The duration of the Pre-historic period, as compared with the historic, may best be conceived when it is borne in mind that very old countries like India, whose history goes back further into the past than any other, have still a lost history apparently far longer than that handed down to us, evidenced by Megalithic and other monuments of unknown antiquity; and again, beyond that, Prof. Blanford; Messrs. King, Foote, Wynne, and other of the Geological Surveyors, have obtained evidence of a still earlier and barbarous race, whose only relics are their stone-implements, fashioned of the Neolithic and Palæolithic types, like those of the aborigines of Gaul and Britain.

How many thousands of years must have been occupied in the gradual distribution of these earliest representatives of our race, whose implements have been found in almost every portion of the globe (formed in the same simple yet persistent types), can only be realized by the geologist who has learnt that many prior races of beings lived and spread out over the whole globe, and have been as gradually exterminated and re-placed with other races, who have followed in successive eons, differing in form, yet modelled on types analogous to those now existing.
