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ORIGINAL ARTICLES.

I.—IS MAN TERTIARY? THE ANTIQUITY OF MAN IN THE ROMAN COUNTRY IN RELATION TO THE GEOLOGY OF THE VALLEY OF THE TIBER.

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THE soil of the Roman country, so interesting to the archæologist for the splendid remains it has yielded of the Roman age, is no less rich in relics which shed light on the history of primitive man. Although researches of this kind began here only ten years ago, the results obtained up to this date have been highly satisfactory. These anthropological investigations have been executed with great care by many independent investigators, among whom may be mentioned Ponzi, Ceselli, Bleicher, De Verneuil, and also the author of this communication, who have collected a great many specimens, and accumulated numerous observations relative to primitive Man.

To give a clear and accurate notion of the succession of pre-historic events in the Roman country, I think it will be useful to lay before my readers a brief general account of the geological formation of the Valley of the Tiber.

At the close of the elevation of the Tertiary strata, forming the great plain of the Roman country stretching from the foot of the Apennines to the shores of the Mediterranean, the ice and snow accumulated during the Glacial period began to melt, producing an immense quantity of water, which, running down to rejoin the sea, caused a considerable erosion of the plain above mentioned, and excavated the Valley of the Tiber, leaving the alluvial deposits upon the sides of the Pliocene hills. The direction of the channel was facilitated by a fault, the effect of a violent earthquake at the close of the Pliocene period. (See the annexed Diagram, p. 434).

Thus the geological structure of the hills has actually initiated this primitive valley. The hills are chiefly formed by strata of Pliocene age, flanked by alluvial deposits of the Pleistocene period. The Pliocene formation is represented by blue marl, overlain by thick beds of yellow sand and gravel, very rich in fossil shells, corresponding to the English crag. The Pliocene beds are everywhere covered

GEOLOGICAL SECTION OF THE VALLEY OF THE TIBER.

Fault, causing
great displacement of
the Pliocene strata.

PP. Ancient Pleistocene.
* * Recent Pleistocene or Travertine.
The river valley is filled with Modern
or Quaternary deposits.

AA. Pliocene Marl.
BB. Pliocene Fossiliferous Sand.
CC. Pliocene Gravel.
DD. Pliocene Tuff.

by superposed beds of volcanic tuff, the last and most extensive marine deposit of that period in the Roman country. This volcanic tuff was ejected from the volcano of Sabatini, actually represented by the group of mountains which now form the basin of Lake Bracciano. The Pleistocene strata are for the most part of mechanical origin, and in a less degree of a chemical nature. They result from the superposition of irregular beds of gravel, sand, and freshwater marl, containing pebbles of various sizes, derived from the detritus brought down from the Apennines. Limestone and *policrome* silex are most abundant, but a great quantity of broken crystals of volcanic minerals, as augite, leucite, olivine, etc., are mixed with and compose the gravel and sand.

This volcanic debris has been derived from the decomposition and erosion of the tuffs, or from the *Latial* Volcanos, whose eruptions were contemporaneous with the formation of the valley of the Tiber.

The chemical deposits are only seen in the broader expanses of the valley, and result in the deposition of vast beds of *travertin*, a freshwater limestone of very uniform texture, and largely used in ancient and modern buildings.

The earliest traces of primitive man consist of angular fragments of silex evidently artificially worked. This silex is usually met with in the form of flint-flakes or knives, spear or arrow-heads, and celts or hatchets. These weapons are always chipped out roughly, their surfaces are never smoothed or polished, consequently they are referable to the Palæolithic or Archæolithic era of prehistoric man.

In the same river-valley gravel, commingled with the worked flints, are frequently found the bones of fossil Mammalia; of these relics of the extinct fauna of the Roman country, the most abundant are:

Bos primigenius, Boj.
Elephas primigenius, Blum.
—— *meridionalis*, Nesti.
—— *antiquus*, Falc.

Cervus elaphus, Linn.
Hippopotamus major, Nesti.
Rhinoceros tichorhinus, Cuv.
Sus scrofa, Linn.

Others less common are:

Hyæna spelæa, Goldf.
Castor Europæus, Owen.
Ursus spelæus, Blum.

Cervus (dama) Romana, Ponzi.
Bos latifrons, Cus.

The latest researches of this kind have disclosed a fact of the highest importance, namely, that flint implements have been discovered in the gravel forming the upper portion of the Pliocene deposits (see Diagram, Bed C.). I have collected some of these flint implements myself on the Pliocene hills of Janiculus and the Vatican; but I must sincerely confess that the evidence of their having been artificially formed appears to me to be open to doubt. On the contrary, however, the flint implements of the alluvial deposits leave no doubt as to their having been artificially formed by the hand of man. For the present therefore we will only consider these undoubted traces of man contemporaneous with the great Mammalia in the Quaternary deposits.

The first and most evident conclusion that may be drawn is, that

the alluvial deposits having, as already stated, been produced by the action of water derived from the melting of the snows of the glacial epoch, it follows that the animals, whose remains occur therein, and the makers of the flint implements associated with them, were living before the Glacial period which destroyed so many of the great Mammalia.

Man must therefore have appeared at the end of the Pliocene period, and during this early time he was in the Palæolithic era, as evidenced by the fabrication of his weapons of silex. No metals nor pottery of any kind have been found in these formations.

Let us now examine the evidence relative to man during the Neolithic age. The Roman country is very rich indeed in remains referable to this more recent epoch. Everywhere in the surface soil are found extraordinary quantities of flint knives and spear-heads, finely formed and polished, and sometimes magnificent hatchets of smoothed stone. These objects are not only found scattered over the surface of the soil, but they are frequently met with accumulated in limestone caverns, imbedded in stalagmite, and associated with them are the fragments resulting from the manufacture of the weapons themselves, in fact a true manufactory of Neolithic implements; a thing unknown in the Palæolithic period, the weapons of which are so inferior in finish and workmanship.

Whilst antiquaries divide the prehistoric period into two distinct epochs, namely, the *Palæolithic* (or *Archæolithic*) and the *Neolithic*, the difference in workmanship between the objects which have been found is so great, that for a long time I believed it might be possible to define an intermediate or transition period from the Palæolithic to the Neolithic. And, indeed, I believe we have found in this district good evidence of such a transitional stage, which I would propose should be designated the *Miolithic* period.

This new period embraces two very distinct although contemporaneous geological formations. These are, (a) the *recent* travertine (so-called to distinguish it from the *ancient* travertine already described), and (b) the 'peperino' formation, a kind of volcanic tuff which occurs in thick strata around the Latial Volcanos. In these two formations are imbedded not only a great quantity of worked flints but also pottery. The flint weapons are not rough like the Palæolithic, nor are they so smoothed and highly finished as in the Neolithic period. The pottery is made of a kind of marl entirely worked with the hands without the use of the potter's wheel, which was evidently unknown; and the vessels are very imperfectly baked, or perhaps only sun-dried. Under the 'peperino' of the Latial Volcanos a vast *necropolis* exists, where hundreds of these utensils lie buried beneath the volcanic dust. The improvement in the manufacture of flint weapons as compared with the Palæolithic type and the presence of a *necropolis* are certainly indicative of progress in the social condition of these ancient inhabitants of Italy.

But here a fact of the highest importance must be mentioned, namely, that in the *necropolis* above mentioned, and also in the tombs inclosed in the recent travertine, we found mixed with the

objects just described, some beautiful vessels of perfect work, resembling those of the ancient Etruscans. There have also been occasionally found hatchets perfectly polished, made of a kind of stone (a Jadeite) that is not found in Italy. From what region were these objects derived? My opinion is that a foreign and more civilized people was in communication with the native inhabitants of Italy during this period, and that a kind of commerce was probably established, and that in process of time this people (certainly a more advanced and civilized race) became the invaders, and that the primitive population of Italy, being less civilized, disappeared entirely.

Upon such an hypothesis the presence of metals mixed with these flint implements and this rude pottery may easily be explained. For it cannot be supposed that a race of men who had attained to the art of separating metals from their ores by smelting, should yet continue to manufacture flint-weapons, and to use them in preference to those of bronze or iron.

I prefer rather to adopt the conclusion that the introduction of metals is good evidence of the presence of a more civilized foreign people, who at first were in occasional communication with the pre-existing population for purposes of trade, and in later times occupied the country. It is necessary to observe that the metallic objects met with consist for the most part of spears and hatchets carefully cast in bronze, which, although an easily fusible material, proves that the people who worked in it were well instructed in the use of the ores of copper and tin. We do not find any trace of iron, the use of which is certainly referable to a posterior age, owing no doubt to the greater difficulty attending the treatment of this metal.

I believe that prior to the introduction of bronze, some metals more easily fusible were employed, and I remember to have once examined a leaden spear-head of rough workmanship, but which had evidently been fused and moulded. This object was found in a bed of Quaternary gravel. But this single fact is scarcely sufficient by itself to establish that lead was the first metal employed by man, although the instance above cited seems deserving to be placed on record.

From the facts stated it seems to me that the existence of a transition period between the Palæolithic or Archæolithic and the Neolithic ages (which I would propose to name the *Miolithic* period) is admissible, and it would be of great importance to learn whether the researches carried on in other countries give the same results as those which have been obtained here.

Certainly in Central Italy this transition period is distinctly indicated, and marks a very clear epoch in the primitive history of human civilization.

Admitting then this new period which I have proposed, and taking the Archæolithic or Palæolithic period as a point of departure, to this would succeed the *Miolithic*, and I conceive that during this middle period the primitive inhabitants of Central Italy were divided into two different populations, which were probably represented by

two distinct races; the one, primitive or native, which continued to use flint weapons, perfecting their manufacture during the successive Neolithic period; the other of more recent introduction (but certainly derived from a more ancient and more highly advanced race as regards its progress in civilization), which, invading the country, gradually superseded the aboriginal flint-implement-making race.

According to this view, the Latin population which actually inhabits the Italian peninsula does not represent the primitive race, but they are the descendants of an exotic people who brought to Italy a civilization much in advance of the aboriginal race.

If it be asked from whence came those early foreign settlers, I think it will not be difficult to prove that they came from Asia, where we also find remains of monuments of the highest historical antiquity, affording records of the most ancient period in human civilization.

The introduction into Italy of this exotic population is referable to the dawn of the modern epoch, whereas the primitive inhabitants of Italy were existing from the end of the Pliocene period, when all the plains now stretching on both sides of the Apennines were covered by the sea, and when the latest Tertiary deposits were being spread over their submerged surfaces. In this remote time Central Italy was represented by an archipelago of mountainous islands, the Apennines being washed to their feet by the waves of the Pliocene sea. Even then primæval man inhabited the mountains, and their calciferous caverns were his sole retreats, nor could he descend into the plains until after their upheaval, when he doubtless witnessed the gradual formation of the great Quaternary alluvial deposits and the eruptions of the Latial Volcanos.

Reviewing the facts derived from these observations, it seems to me permissible to draw the following conclusions as to the history of primitive man in the Roman country.

1st. The earliest appearance of man in Central Italy can be traced back to the end of the Pliocene period, his weapons having been found in the oldest Pleistocene deposits, and perhaps also in the latest Pliocene formations.

2nd. Man was contemporaneous with the great extinct Mammalia. He survived the Glacial period, and was witness to those imposing scenes produced by the eruptions of the Latial Volcanos, in the great alluvial deposits of which our present river-valleys were excavated.

3rd. Primitive man at first lived in a very rough manner, using only flint weapons of the Palæolithic type. Subsequently he traded with people of another continent possessed of a higher civilization. This continued through the Miolithic period. In the Neolithic period the primitive race was gradually replaced by the exotic one; and here our investigation ceases, and we enter upon the period of ancient history and tradition.

In the subjoined table I have attempted to show the geological formations of the Roman country in which the remains of prehistoric man may be traced.

RECORDS OF PREHISTORIC MAN IN THE ROMAN COUNTRY.

Geological Periods.	Nature of the Deposit.	Periods in the History of Man.	Evidences of Man's presence.
IV. Modern or Quaternary.	Recent alluvial deposits and surface-soil of the country.	Neolithic.	Flint perfectly cut and worked; hatchets of Jadeite; pottery with the first pictures.
III. Newer Pleistocene.	Travertine volcanic products of the Latial Volcanos.	Miolithic.	Silex well polished, but not perfectly cut; rough pottery mixed with a finer quality; metals (bronze).
II. Ancient Pleistocene.	Gravel, sand, and marl, with the bones of great Mammalia.	Palæolithic or Archæolithic.	Flint implements of a more perfect workmanship; Metals ? (Lead).
I. Upper Pliocene.	Gravel and yellow sand with marine fossils (= Crag Mollusca.)	First appearance.	Flint implements roughly worked.

II.—THE ANTIQUITY OF MAN.

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OF all geological questions, perhaps that of the Antiquity of Man is the most popular. Nor is it one on which geologists have been rash or hasty in advancing new ideas; quite the reverse: they have lagged behind the evidence. In the "Principles of Geology," one of the most instructive chapters is that in which the author treats of the progress of Geology. Therein Sir Charles Lyell has shown how the science had been retarded for three hundred years by men's reluctance to admit such a simple and obvious matter as the marine origin of stratified rocks, owing to a fixed idea that the world had come into being a short time since in much the same state as it appears to-day. Yet the illustrious author of the "Principles of Geology" let pass for thirty years the evidence that Man was contemporaneous with the extinct Pleistocene mammalia. In 1833 the evidence on this point was nearly as complete as it is now; but it was practically neglected because it did not square with preconceived ideas. In fact, it was not accepted till Lyell himself, reviewing the facts in his usual masterly manner, summed up judicially in favour of the new views in his first edition of the "Antiquity of Man." Now, to compare great things with small, a like reluctance to admit new evidence on the subject is widespread. Then the prejudice was that man was modern, that he never saw old-world mammals any more than Silurian forms of life; now, admitting perforce his co-existence with