VI.—ON THE OCCURRENCE OF *URSUS FEROX* IN THE PLEISTOCENE OF MALTA.

By JOHN H. COOKE, F.G.S., etc.

THE labours of the late Admiral Spratt, R.N., and of the late Professor Leith Adams, F.R.S., in the cavern deposits of the Maltese Islands were rewarded by the finding of a unique and interesting land fauna, among which were Elephants, Hippopotami, Land-tortoises, gigantic Dormice, and aquatic Birds, the presence of which in so limited an area was incompatible with the present existing physical conditions of the Islands. While carrying on his work of investigation in a cave in the Zebbug Gorge, Uied el Kbir, in 1859, Spratt noticed that many of the remains of Elephants that were exhumed presented the appearance of having been fiercely gnawed,¹ and later on when Adams was excavating the Mnajdra gap it was observed that many of the elephantine remains were in a similar condition.

From the situations in which the remains were found, and their condition, these gentlemen inferred that carnivora had lived in the district contemporaneously with the hippopotami; but notwithstanding the most diligent research extending over a period of twenty years, the only tangible evidences in support of their inferences were these gnawed bones.²

During the Spring of the present year I was engaged in carrying out, with the aid of a grant from the Royal Society, some excavations in the Har Dalam cavern, a subterraneous gallery situated in a gorge of the same name in the eastern extremity of Malta, and after having excavated six large trenches and obtained some hundreds of bones of *Hippopotamus pentlandi*, *Elephas mnaidriensis*, *Cervus barbarus*, and numerous other animals, I had the satisfaction of discovering an entire ramus of the lower jaw of a Bear, with its canine and molars *in situ*, as well as five other canines belonging to other individuals of the same species.

The trench in which the jaw and teeth were found is situated on the left-hand side of the cavern, at a distance of fifty feet from the entrance. The floor was strewn to a considerable depth with large boulders, which in some places were heaped up against the sides of the cavern to a height of from two to three feet. Having cleared a space of about thirty square yards, I commenced operations on a friable marly loam, which in this part of the cavern takes the place, as the surface layer, of the red soil that is found farther within.

The first evidence of the presence of the carnivoræ was a large canine, the fang of which was unfortunately broken by a blow from the pick of one of the workmen, before the tooth was noticed. This discovery was soon followed by that of a complete ramus of the lower jaw, with its molars, and canine teeth *in situ*. The peculiar nature of the matrix in which it was embedded unfortunately pre-

¹ Proc. Geol. Soc. vol. xxiii. p. 288.

² In a collection of fossils sent by Capt. Spratt to Dr. Falconer, a small canine of a carnivorous animal of the size of a fox was present.

vented me from getting it out entire. The articular processes broke off, but a few fragments were recovered and pieced together.

Four other canines were afterwards discovered, each of which was in a fairly perfect state of preservation.¹ Associated with these remains were found several vertebræ and fragments of limb-bones of hippopotamus, and vertebræ and portions of horns of stags; but none of them presented any evidences of having been gnawed.

The excavation which, when finished, measured 12 feet, by 10 feet, by 6 feet, exhibited in section the following sequence of deposits:

SECTION OF HAR DALAM CAVE, AT TRENCH NO. VI., SHOWING SUCCESSION OF DEPOSITS.

- A. A layer of rounded boulders that lay scattered over the floor to a depth of two feet.
- B. Cave-floor consisting of a friable marly loam, about nine inches thick, containing numerous land-shells, roots of plants, limpet shells, a shell of a *Cerithium*, and the vertebræ of a small fish. These latter had evidently been introduced.
- C. A stratified layer of rounded boulders, intermixed with a grey marly loam containing an abundance of land-shells.
- D. A friable marly loam with a few pebbles. Entire antlers, jaws, and limb-bones of *Cervus barbarus*, together with fragments of very old pottery, occurred in abundance.
- E. A layer of indurated, light-grey loam containing a few antlers, teeth, and bones of *C. barbarus*, and a jaw and five canines of *Ursus ferox*, and remains of *H. pentlandi*.
- F. A layer of about 1 foot 6 inches in thickness, similar in composition to E, but more indurated. Lying at the base of this layer, and on the original rock-floor of the cave, were numerous molars, portions of tusks, and limb-bones of Hippopotamus.

All of the layers in this section presented distinct evidences of stratification; but in the lower ones the thickness of the deposits and their comparative homogeneity contrast strongly with the numerous thin layers of which the upper beds are composed, and with the assortment of boulders, pebbles, and organic remains of which they are made up.

From the evidences thus afforded it seems that the deposits owe

¹ One of these Mr. A. S. Woodward, F.G.S., has determined as belonging to the left side of the mandible of a species of *Canis*, equalling a wolf in size.

their origin to periodical floodings of the cavern, during which the remains that lay scattered over the cavern floor, near the mouth, were washed further within and were buried in the muddy sediments of the water.

The state of mineralization in which the remains of the Hippopotamus, the Stag, and the Bear are, indicates that these animals occupied the Maltese area contemporaneously.

Further researches will, I have no doubt, lead to other discoveries, and it will therefore suffice for the present to simply place on record these, the first tangible evidences of the former occurrence of carnivora in the Maltese area.

NOTICES OF MEMOIRS.

Dr. C. I. FORSYTH-MAJOR—ON THE FOSSIL-REMAINS FROM SAMOS.

C. I. FORSYTH MAJOR, LE GISEMENT OSSIFÈRE DE MITYLINI. EXTRAIT DE SAMOS, ETUDE GÉOLOGIQUE, PALÉONTOLOGIQUE ET BOTANIQUE. Par C. De STEFANI, C. I. FORSYTH MAJOR, et W. BARBEY. (Lausanne, Bridel, 1892.)

SEVERAL ancient authors, as Ælianus, Heraclides, Ponticus, and others, speak of the former existence of monsters on the Isle of Samos, and mention expressly that their bones—which are claimed by Plutarch to be the remains of the Amazons slain by Bacchus—are still to be seen in the island.

This induced the author, when visiting Samos for other scientific purposes, to search for fossil bones; and he was fortunate enough to find a rich deposit of them in the vicinity of the village of Mitylini, in the eastern part of the island, imbedded in a volcanic tufa, alternating with strata of sandy marls and gravels. These same deposits had been seen and described almost fifty years ago by Admiral (then Lieutenant) Spratt, who failed, however, to discover fossils in them. The following is a complete list of the Vertebrate fauna of Samos, compared with other deposits in which a certain number of species have been found agreeing with those of Samos.

From the following comparison it may be seen, that of the 43 Mammalian species from Samos, 25 at least are represented equally at Pikermi (Greece), 13 at Maragha (Persia), 7 at Baltavar (Hungary), 7 at Mont Leberon (France), so that the contemporaneity of all these deposits, and many others less well known, is placed beyond doubt.

Whilst the majority of Palæontologists assign all these deposits to the older Pliocene, the author adduces reasons for which, in accordance with the views of Professors Boyd Dawkins, Depéret, Gaudry, and others, he holds them to be Upper Miocene. He points out that the other view is to be traced back to Dr. Theodor Fuchs, who regarded a very recent deposit of fossil shells near the sea-shore at Raphina, four miles distant from Pikermi, as contemporaneous with the Pikermi beds. If this view were correct, the Pikermi beds would have to be assigned to the uppermost Pliocene, or even to the Pleistocene, so that Dr. Theodor Fuchs must have been led into an error of observation.