tion of their ever having had inscriptions upon them, not a letter or mark of any kind appearing under the most favourable light, which distinctly shews the curls of hair on the heads.

NOTICE OF THE SKULL OF A DOG EXHUMED FROM THE ALLUVIAL GRAVEL OF NORWICH, IN 1851. BY MR. H. DENNY, A.L.S.

From the difficulty which apparently exists in identifying the Fossil remains of particular species of animals, as for instance, those of the Genus Canis, I avail myself of this opportunity to bring before the Society a short notice of the skull of one of the Canidae, which I believe to be that of a Dog, recently presented to the Museum of the Leeds Philosophical Society, by P. O'Callaghan, Esq., of Cookridge Hall. This specimen was exhumed from a bed of gravel at the depth of sixteen feet, along with the bones of Deer and other animals, in the year 1851, by some workmen employed in sinking a shaft for a new chimney at the gas works in the parish of St. Martins, at Palace, in the city of Norwich.

The first comparative anatomist of the day, Professor Owen, in his valuable Manual of British Fossil Mammals, appears to be of opinion that it is extremely difficult to distinguish, with certainty, the skull of the Dog from that of the Wolf, from the specimens which have come under his observation; and that the majority of those remains which have been assigned to the Dog, do not differ sufficiently from those of the Wolf to warrant their separation. There are, however, characters in the latter to which Professor Owen alludes, which I think are sufficient to identify the Wolf. These are the great size of the canine teeth, the greater length and height of the occipital sagittal crest, and the triangular space between the orbits being narrower and
flatter, and there are others I have observed to which I shall shortly allude.

In the specimen to which I have to call your attention, the characters of the Wolf are not developed, and it consequently suggests the probability of its having belonged to a Dog. The absence of these characters does not arise from age, as the animal appears to have been mature. The sutures of the cranium are perfectly united, the teeth full formed, and if we may judge by comparison of the skull, the animal has been rather larger than the Greyhound of the present day; probably more resembling the ancient Irish Staghound, remains of which occur in the bogs in Ireland, and I believe in similar situations with those of the Wolf and Gigantic Deer.

When compared with the skull of a young Wolf of equal size, the difference in form is very perceptible. The greater length and narrowness of the intermaxillaries and nasal bones, the smaller size of the canine teeth, and the still smaller size of the molar teeth, the latter of which are at most only about one half the size of those of the young Wolf. Although our specimen, as I have already stated, has been a mature individual, which is an important point to bear in mind, as, supposing it to have belonged to a Wolf, these characters ought to have been just the reverse. The incisors, also, are much smaller in our specimen. In the young Wolf's head, I observe a greater breadth of the nasal cavity, one inch wider than in the Dog, and, consequently, more space for the turbinated bones, upon which are spread the olfactory nerves or organs of scent, a faculty peculiarly acute in the Wolf, but the reverse in Dogs of the Greyhound tribe, which chase more by sight. The orbital projections are more acute, the width across this portion of the head being greater by half an inch, and the occipital ridge more elevated than in the Wolf, with
which I have compared it, but neither of these characters I consider of much value in the present instance, as the latter animal having been a young one, these parts are less developed at this age than they would have been in mature life, a point I regret that I have not had an opportunity of verifying, by examining skulls of the Dog and Wolf of similar size and age.

On comparing the two skulls from above, by far the most prominent character in the Wolf, is the greater breadth of the maxillary bones below the zygomatic arch. On viewing the under side, the larger size of the tympanic bones are also very striking, allowing greater capacity for the organs of hearing, another feature highly characteristic of the Wolf. As fossil bones are considerably heavier than those from recent animals, and lest any doubts might be entertained of its antiquity, I was desirous of testing this point, and the result was satisfactory. The skull of the recent Wolf weighed seven ounces, while that of the fossil Dog weighed ten ounces, which additional weight it would be unreasonable to suppose could be the effect of only a few years interment; and, therefore, I conceive that any supposition of its recent existence is untenable, and, also, that the skull has belonged to a Dog, and not to a Wolf, is, I think, equally apparent from the dissimilar characters I have pointed out.

Wishing for the opinion of my lamented and highly talented friend, the late Dr. Ball, M.R.I.A., of Trinity College, Dublin, I forwarded him a correct sketch of the skull in question, and received the following reply, which supports the supposition I have ventured to advance:

3, Granby-row, Dublin, July 30th, 1866.

My Dear Sir,—The sketch you send is of the contour of a Wolf's head, of, perhaps, two years old; but, if the drawing be correct in the proportions of the tooth, the largest molars and the
canines are not large enough for a Wolf. I would, therefore, say your specimen is the skull of a Dog, of a Wolfish aspect. I have studied the subject a good deal, and made instructive collections, and have Wolves' skulls of many ages as well as Dogs of various breeds, and several of both species from the bogs. I have not yet got any skull of a Dog so large as I should suppose our great Irish Dogs possessed; I rather imagine these animals were at all times rare, and, probably, the property of great men. If they at all exist at present, they are probably in the mountains of the north of Africa, where is to be found a Dog possessed of the proportions ascribed to our ancient animal; and knowing from other circumstances that some intercourse existed in remote ages between the north of Africa and Ireland, hence I am led to believe came the great Dog in question.

Truly yours,

E. BALL.

In conclusion, I would observe, it is not a little remarkable that of the animals which man has rendered subservient to his use, few remains occur in a fossil state. The Ox, Swine, Goat, and the Horse, are, I believe, the only examples; while those of the Dog and Sheep, which are and have been more immediately associated with his various migrations, are either unknown or doubtful. Can this arise from the supposed greater antiquity of the former animals, or that the latter are altered by domestication from other animals, as the Dog from the Wolf, or the Sheep from the Argali, or some other untamed species of Sheep? The former point is a geological problem which it is very difficult to solve, as the life periods of some of these animals is so interwoven with that of others of supposed remote date, and long since extinct. The latter is also an obscure page of past history, which, however, is not so beset with conflicting evidence. That the Dog, as a species, has existed from the earliest period of man's history is evident, as the monuments of Egypt
and Nineveh testify, upon the ruins of which we see different varieties of this animal depicted or sculptured, as also from the various allusions in Scripture to its habits. In the earliest or Pantheistic age of Egypt, the Dog was deified; but in other nations it was allowed to prowl the streets unowned and uncared for, which would militate against any supposed change in its character from domestication in remote ages. The strongest argument, however, I conceive, (independent of anatomical peculiarities,) against the Dog being only an animal altered by circumstances, and originally descended from the Wolf or Hyaena, is the fact, that all these animals are separately and accurately, as regards their habits, described in the Sacred Writings; and, consequently, were at that early period in the world's history as distinct and well known as at present.

It is also worthy of remark, that in every part of the globe where man exists, the Dog is his associate, and in some instances even more docile than his master, as we find is the case in the species, or variety inhabiting New Holland, where the natives are the most brutal of the human family. The Dog, therefore, having existed as a species as early, if not anteriorly to the human era, there does not appear any plausible reason why its remains should not occur in the superficial deposits, as well as those of its contemporaries the Hyaena and Wolf, which are distinctly identified and allowed to be fossil, especially when the latter is known to have inhabited this country as late as the 17th century. With regard to the Sheep, however, the evidence is not so conclusive, but that it has been derived from some other allied species is more than probable, from the fact, that in no country in the known world does the Sheep exist wild with its present characters. That the period of its domestication is, however, very remote, is evident from the circum-
stance that the pastoral occupation of the progenitors of our race forms the theme of both sacred and profane historians in the earliest ages of the world; and it is a significant fact, as Professor Owen remarks "that the Scythians of the elevated plains of Asia Minor, who, according to Herodotus, obtained felt; and according to Strabo, food from their flocks, as well as the patriarchal Hebrew shepherds of the plains of Mesopotamia; the earliest instances of pastoral life, dwelt in that part of the earth where the wild Argali (Ovis ammon) still exist in greatest numbers." Why, however, remains of this animal have never been exhumed is a most extraordinary circumstance, as it is certain that the Sheep has been a contemporary of the Ox, Horse, Deer, Swine, and Goat, which have alike continued down to modern times both wild and domesticated, and would be subject like them to the same geological catastrophes, and consequently ought by parity of reasoning to be found under similar circumstances.

Only two suppositions can be hazarded to account for the absence of the bones of the Genus Ovis, and neither of them are satisfactory. First, that anteriorly to the human era, they became the prey of the various carnivorous animals which then predominated, and which, like the Hyæna, might even devour their bones, and thus obliterate all traces of their former existence. That such a fate befel the other Ruminantia is evident; but yet in the caverns and beds of alluvium fragments of such bones occur with those of their carnivorous destroyers. Secondly, If we suppose that the Sheep did not exist previously to the human era, and were indigenous only in the east, with the geology of which we are not so familiar as with the various countries of Europe, there is still a remote probability of their bones being exhumed; unless it is argued that all the deposits in which
they could occur, date from an epoch long anterior, and that since its introduction into Europe no geological changes have taken place of sufficient magnitude to entomb any number of their bones. Lastly, the Sheep is an animal of such general consumption for domestic purposes, that none of its remains are scattered over the country to be drifted by local floods into caverns, or imbedded in alluvial deposits.