ART. XXIX.—*On Some New Forms of the Dinocerata;* by W. B. SCOTT.

IN 1875, Professor Cope established the *Amblypoda* as an order of hoofed mammals, including as its two sub-orders the Coryphodons of the Wahsatch Eocene and the Dinocerata of the Bridger. This association of animals so divergent in appearance rests more especially upon the structure of the feet

and brain, and assumes that the two groups had a common ancestor, if indeed the one did not stand in an ancestral relation to the other.

If Professor Cope's hypothesis be correct we should naturally expect to find a series of forms connecting the two groups and leading to a common term, showing how the large and most curious Dinocerata could be closely related to the smaller and much less striking Coryphodons. In the latter there is a complete set of upper incisors and a canine tusk of moderate size; the lower incisors possess but a single lobe and the lower canine is erect and as large as the upper tusk, which it opposes. In the Dinocerata the upper incisors are entirely wanting, the canine is converted into a great sabre-like tusk; while the lower canine is very small, shaped like the incisors and functionally belonging to the latter, which present the extraordinary peculiarity of having compressed bilobed crowns. In the Coryphodons the cranium is nearly flat on top, there being no sagittal crest, and there are none of the great osseous protuberances which give such a characteristic and peculiar appearance to the skull of the Dinocerata, although in some species of Coryphodon (e. g. *elephantopus*) there are small swellings which indicate these protuberances; there is also a beginning of the supra-occipital and parietal crests which in Uintatherium reach such great proportions. The nasals are thin, short and weak, ending anteriorly in a point and strikingly different from the very long and heavy nasals of the Dinocerata.

The only form hitherto known which in any way helps to fill the gap between the two sub-orders of the Amblypoda is the genus *Bathyopsis* Cope, from the Wind river or lowest Bridger beds of Wyoming. Of this genus only the lower jaw has been found; but the important point is brought out that the lower canine was a large erect tooth, probably opposing the upper canine and not forming a part of the incisor series as is the case in Uintatherium. The form and position of this tooth make it exceedingly probable that the upper canine had not reached the great sabre-like proportions found in the other Dinocerata. It is not certain whether the presence of the first premolar is a constant feature or simply indicates a milk-molar persisting longer than usual. The latter is so frequently the case, that it is impossible to attach any value to its occurrence in an isolated specimen.

The Princeton Expedition of 1885 had the good fortune to discover, in the Bridger beds of Henry's Fork, Wyoming, another missing member of this hypothetical series. The new genus, for which I propose the name *Elachoceras*, may be briefly defined as follows: animals allied to Uintatherium, without upper incisors, and having six molars of the Uintatherium pattern, and large upper canine tusks; but without nasal pro-

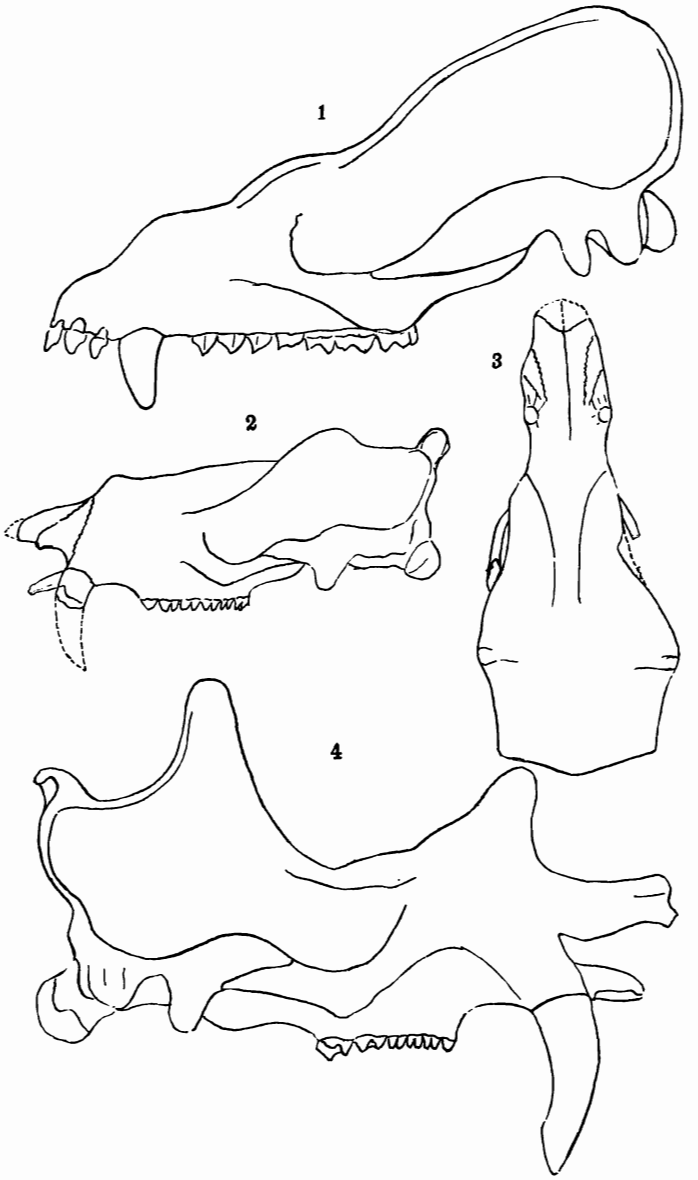

FIG. 1.—Skull of *Coryphodon*, left side (after Cope). FIG. 2.—Skull of *Elachoceras parvum*, left side. FIG. 3.—The same, top view. FIG. 4.—Skull of *Uintatherium alticeps*, right side.

tuberances and having only rudiments of the maxillary and parietal protuberances. The supra-occipital is pierced by two large venous foramina, placed one on each side of the median line.

The species may be called *E. parvum* and is defined by the low supra-occipital and parietal crests, the long and very narrow muzzle, the presence of a single tubercle on each molar tooth, and the small size of the animal (see figs. 2 and 3). It might at first sight be supposed that we have here the skull of a female or young animal, which would account for the very small size of the so-called horns. But the complete and somewhat worn dentition and the state of the sutures at once negative the supposition that the animal was not entirely adult. The question of sex is rather more difficult to decide. Professor Marsh has shown that the skulls of female Dinocerata are characterized by small canine tusks and less prominent "horns." Professor Marsh very kindly allowed me to make a careful examination of the female skulls in his collection, which immediately convinced me that Elachoceras is not a mere sexual variety of Uintatherium, as I had suspected might be the case. The tusks are not only proportionally but actually of much greater diameter than in very much larger females. In point of fact, in proportion to the size of the skull, the tusks of Elachoceras are nearly if not quite as large as in the largest Uintatherium males. On the other hand the protuberances are very much smaller than in any known female and the nasal pair seems to be altogether absent. I cannot, however, state this with entire certainty, as the extreme tip of the nasals is broken off, but the fact is more than probable for these reasons: (1) The nasals are preserved beyond the tips of the premaxillæ, where in all other known Dinocerata the swelling for the protuberance is visible. (2) In Elachoceras the nasals are exceedingly thin and weak, whereas the nasals of Uintatherium are strikingly strong and heavy; in the former there is no trace of any thickening or swelling at the tips of the bones.

Such a combination of large tusks with rudimentary protuberances is not what we find in any known female and seems to remove all reasonable doubt as to the sex of the specimen before us. If this be granted, the distinction of the genus from Uintatherium necessarily follows.

It is interesting to note that Elachoceras very much resembles the young specimens of the Dinocerata, especially the one described and figured by Professor Marsh (see his Monograph, p. 15, fig. 8), though even in this young skull the protuberances are much more prominent than in Elachoceras.

Another possibility is that in Elachoceras we have the missing skull of Bathyopsis; but this I consider to be extremely improbable, from the very peculiar character of the molar teeth

in the latter, which would almost certainly imply a similar modification of the upper molars. Another reason against such a reference comes from the presence of the large canine tusk of the upper jaw, which, as we have already seen, had probably not attained such dimensions in Bathyopsis. With the exception of the last named genus, Elachoceras is the smallest known member of the group, the skull measuring only about 22 inches in length.

In the same locality, though at a somewhat higher level, was found the large Uintatherium skull shown in fig. 4, which undoubtedly represents a new species of that genus, *U. alticeps.* Nothing is more hazardous than making new species of the Dinocerata, for, as every one who has studied them knows, they are extraordinarily variable, and if judged by the usual criteria almost every skull would constitute a distinct species. However, by carefully comparing nearly forty skulls, I have found that certain characters may be depended upon to determine the various species, not being subject to such apparently capricious variation. Among these may be mentioned the general shape of the skull, the *position* (not shape) of the "horns," the shape of the occiput, the character of the tusk, and the structure of the molar teeth.

Examined with reference to these characters the skull shown in fig. 4 is unquestionably distinct. It is one of the broad-headed species, with remarkably high occiput, the parietal protuberance is in *advance* of the post-glenoid process. (I have found the best method of exactly determining this point is to connect the tip of the pre-maxilla with that of the post-glenoid process and erect perpendiculars on this line.) The molar teeth are much as in *U. lucare*, but without tubercles on the anterior cingulum; there is a pair of small tubercles at the entrance of valley of the last molar. The lunar has no facet for the trapezoid. The great height of this skull, as compared with its length, suggested the name *alticeps.*

The value of the tubercles on the molar teeth as a specific character has been questioned, but I am inclined to think that considerable importance must be attached to them. For example, the very large series of Palæosyops remains in the Princeton Museum, ranging from species smaller than the sheep up to those as large as the rhinoceros, show without exception a small tubercle between the anterior cusps of the upper true molars. The tubercles on the teeth of the Dinocerata show no such constancy as this, it is true; nevertheless they are sufficiently constant to rank as species characters.

These notes are preliminary to a much fuller account which will shortly appear in a paper on the variations of the Dinocerata.

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