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SOME POINTS IN THE COMPARATIVE OSTEOLOGY OF THE TAPIR.

BY CHARLES EARLE, AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK.

So much has been written in the last decade on the evolution of the horse, that I think it will not be out of place to compare some of the skeletal structures of its most generalized relative, the tapir. The tapir represents in the fauna of the present day the most generalized member of the odd-toed Ungulates, and in its osteological structure we find the closest relationship with those old Eocene Perissodactyles, which are now entirely extinct. As a whole, the structure of the tapir presents us with a most generalized form, but the extreme modification of the nasal region of the skull is a modernization, as it is called. Of all the known Tapiroids of the Eocene there is none which shows this extreme specialization of the facial region of the skull for a proboscis. Cuvier in the "Ossemenes Fossiles" compares the osteology of the American and Malayan tapir in a general way, but does not treat the subject in detail.

In the present paper, I wish to speak in particular of the comparative evolution of the foot structure in the tapir. In such widely isolated forms as the American and Malayan tapir we would naturally expect to find some differences in the details of their foot-structure, and such is the case. On evolutionary ground these differences are of great interest, but I do not wish to trouble my readers with a lot of dry anatomical details, without the latter being of some interest.

As a word of introduction I would say, that the derivation of the modern digitigrade Ungulates has been from an animal with a plantigrade foot, the latter having had five complete digits. An approach to this type is seen in the Puerco genus *Periptychus*. Another point of great importance in the structure of this primitive or ancestral foot was that the various elements of which it was composed were arranged one above the other; the serial arrangement as it is called. The carpus and tarsus of the Eocene *Phenacodus* exhibits the serial order of its elements. Now in the evolution of the foot-structure of the tapir, it has departed from the serial order above described, and with this specialization has occurred a loss of lateral toes. However, the tapir has been fortunate enough to lose only one of its anterior toes, whereas the horse and rhinoceros have lost more.

When we compare the structure of the fore feet of the common Brazilian tapir (*T. Americanus*) with that of its Malayan relative, we find considerable difference in the shape and relation of the bones of the carpus. This relationship is due to the comparative specialization in the foot-structure of the one species over the other. In the American tapir the external lateral toe is very much reduced and functionless. In the living tapir this fifth digit transmits little or no weight to the ground. Co-ordinated with the reduction of the fifth digit in this species is the growth of the median digit of the manus. Another co-ordination of the reduced size of the fifth digit in the American tapir is the large articulation of the unciform bone with the lunar. The lunar has also no contact, or a very small one, with the magnum anteriorly.

It has been observed in the evolution of the foot-structure of the Perissodactyles that in the earlier and heavier forms the fifth digit of the manus is always largely developed, and with the large size of this digit is the comparatively small size of the median In this respect, these earlier forms approach more nearly in their foot-structure the even-toed Ungulates (*Artiodactyla*). Again, in these less specialized forms the long axis of the unciform bone is always horizontal.

The position of the unciform is co-ordinated with the large size of the fifth toe; and as a consequence there is a smaller contact between it and the lunar, than in the later and more specialized forms. We observe then, as a rule, that as the unciform begins to rotate upwards and assume the vertical position, the external lateral digit becomes more and more reduced in size.

Another correlation in reference to the large size of the lateral digit is the nearly subequal distal facets of the lunar, an adaptation which is for the equal transmission of the weight of the foot on both sides of the median axis. The magnum is also much depressed and broad in those heavy and more ancient forms.

Turning to the manus of the Malayan tapir, we find the external lateral toe more developed than in the American form. There is also less difference in size between the latter and the median toe. The lunar has a large contact with the magnum anteriorly; the latter bone being broader than in the American form. That less displacement has taken place in the manus of the Malayan tapir is shown from the fact that the unciform and scaphoid bones are widely separated, whereas in the American tapir these bones nearly touch each other. The approach of these latter bones takes place with the reduction of the fifth toe until in some species of rhinoceros they are nearly in contact.

As for the tarsus we observe that the hind foot of the Malayan tapir is broader and heavier than in the American species. A very important difference between the structure of the pes in these two forms is that in the Malayan species both the lateral metatarsals articulate with the ectocuneiform, whereas in the Brazilian form only the internal metatarsal touches this podial element.

In conclusion, we see from the above characters that the manus of the Brazilian tapir is considerably more specialized than that of the Malayan tapir; on the other hand, the pes of the former is not so much modified in structure as that of the latter species. In other details of the skeleton of the tapir, I am not aware that many differences exist. In relation to the lumbar vertebral articulations, I would observe that they are very simple and articulate by plane surfaces. In general, the Eocene Perissodactyles (*Hyracotherium*, *Hyrachyus*) have embracing vertebral articulations.

THE SPEECH OF CHILDREN.

BY A. STEVENSON, ARTHUR, ONTARIO, CANADA.

THE term speech ordinarily signifies articulate vocal utterance in conventional forms, intentionally expressive of feelings or ideas. In treating of speech as a product of intelligence too much is sometimes made of the articulation factor. For articulation is not characteristic of man alone, and among the lower orders, the elephant and the dog, which do not articulate, are more intelligent than the articulating parrots. Moreover, the child, before he can articulate, employs inarticulate utterance with intentional and striking expressiveness.

The first cry of a child, whether or not we call it a rudimentary form of speech, is certainly a vocal utterance strongly expressive of feeling. Though the element of intention is absent for several months, yet there is a considerable variety of expressive quality in the child's cries during this time. This organism, indeed, is like a wind-harp responding in various tones to diverse sense-impressions.

These early cries are expressive simply of pain or distress, and their expressiveness consists partly in tone and party in intensity.