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AN ANCHITHERIINE HORSE FROM THE MIDDLE MIOCENE OF NORTHEASTERN COLORADO

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Abstract.-- A fragment of lower jaw with some deciduous and permanent teeth is reported from the Martin Canyon Local Fauna.

Miocene deposits containing the Martin Canyon Local Fauna in Logan County, Colorado have yielded little spectacular material; the specimen reported here is no exception. After seven years without finding more evidence I feel obligated to report on the material at hand.

Anchitherium sp.

Referred specimen.-- No. P-453, Zoology Department, Southern Illinois University, Carbondale; parts of lower jaw containing right dc, dm1-3, pm2-m3 and left i3, dc, dm1-3, pm3-m3. Two incisors and two fragments of the occipital bone found near the jaw may belong with this specimen. Collected in the buried stream channel containing Quarry A in Martin Canyon (Galbreath 1953, Wilson 1960), NE¼ Sec. 27, T. 11 N., T. 53 W., Logan County, Colorado. Part of this material is illustrated in Figure 1.

Although badly damaged, the parts of the jaw were well-enough bound together by rock, soil, and roots of vegetation to assure association and identification of the parts. In preparation all teeth on the right side, except the deciduous canine and first molar were removed from the jaw and cleaned.

Dimensions.-- Lengths of tooth series and anteroposterior-transverse measurements of the teeth of the right side are (in mm): Lengths: dc-dm3, 111.0; dm1-3, 65.0; p2-m3, probably less than 130.

	dc	dm1	dm2	dm3	i1 or i2
Anteroposterior:	6.5	23.0	21.9	21.6	7.1
Transverse:	5.0	13.9	15.0	14.4	9.3

	p2	p3	p4	m1	m2	m3
Anteroposterior:	20.0	21.5	21.2	21.1	21.0	17.9*
Transverse:	11.5	12.4	14.0	16.2	15.8	11.7

*Anterior end to rear of base of entoconid.

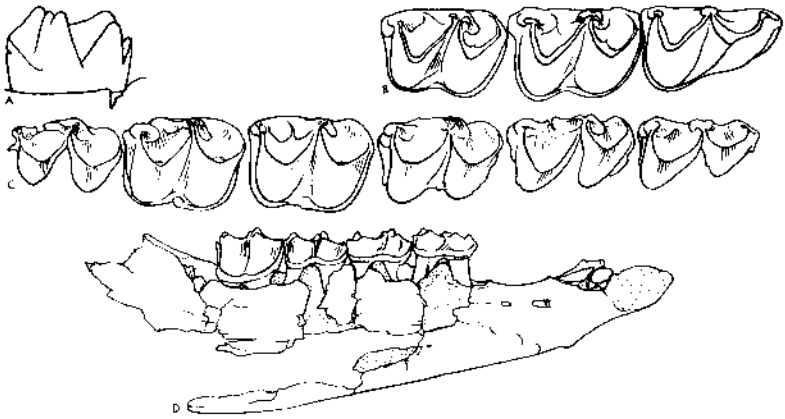

Figure 1.-- Anchitherium sp. No. P-453, Zoology Department, Southern Illinois University, Carbondale. A, lingual view of right m1; B, occlusal view of right dm1-3; C, occlusal view of right p2-m3; and D, lateral view of right jaw with dc-dm3 and m1-2. Figures 1B and 1C have each tooth spaced apart and oriented with the lingual side perpendicular.

Considering the sum of the lengths of the teeth, possible overlap, and the space occupied by the deciduous cheek teeth that were in sockets, I think it is probable that the p2-4 series could have had a length near 65 mm. The molar series probably would not exceed 65 mm in length if 5 mm were allowed for the missing part of m3.

Description.-- The illustration of the deciduous teeth (Fig. 1B) is adequate to show the principal features and similarity of these teeth to the permanent teeth.

The two incisors found in the weathered matrix with the jaw are either right and left i1 or i2. Both teeth had erupted. A left incisor (possibly i3), buried in the jaw anterior to and below the deciduous canine, is not far along in its development having only a faint trace of completed enamel on the leading edge of the tooth. Alveoli (5 mm long, 4 mm wide, and 9.5 mm deep in the left jaw) for right and left p1 were separated from the root of the dm1 by less than a millimeter of bone.

The permanent cheek teeth nicely demonstrate the sequence of events in the enameling of the crowns and the formation of the cingula -- information that is necessary to appreciate the description of these teeth. Vertical, fluted ridges with the appearance of dull enamel extend downward from the tips of the principal cusps and the hypoconulid; as the formation

of the ridges take place lower down the upper part of the ridges are covered by solid, glassy enamel. The completed enamel exhibits, in irregular distribution, shallow and fine horizontal striations spaced approximately four per millimeter. Such striations are known on the teeth of other members of the Perissodactyla and, so far as my evidence is concerned, occur on permanent teeth but never on deciduous teeth. These striations are obviously a part of the developmental process in forming enamel but I have not found references to striations in dental literature which can confidently be identified with these in equids.

None of the premolars have the base of the crown formed; consequently only the medial part of the anterior and posterior arms of the cingula are present. P2 shows some completed enamel on the inner surface of the hypoconid, p3 has completed enamel surface on the tip of the metaconid-metastylid cusp and the tip of the entoconid, and p4 has completed enamel on the tips and upper parts of the principal cusps and the tip of the hypoconulid. M1, firmly anchored in the jaw, has crown and roots complete. The end of the roots are close to the base of the socket. Constriction and formation of root-tips had not started. M2, near eruption, has a complete crown but the roots are damaged. Both of these molars have the cingulum encircling three sides of the crown. The damaged m3 has signs of completed enamel on the inner surface of the paraconid and tip of the metaconid-metastylid cusp; although not visible in the occlusal view, the anterior cingulum has started to develop.

In degree of development the p2-m3 series may be rated 5-4-3-1-2-6 with number 1 being the erupted first molar and number 6 being the third molar. This sequence of development is consistent for the various parts of the teeth.

The lingual view of m1 (Fig. 1A) shows the extent to which the tip of the metaconid-metastylid cusp is divided. P3 and p4 have their tips less divided while the m2 shows only the vaguest trace of a separation. P2 and m3 have undivided tips. In all these cheek teeth the metaconid-metastylid cusp is slender and cone-shaped like those in the anchitheriine-hypohippine line and unlike the plump counterpart seen in parahippine teeth. The entrance to the flexids are open.

The collective evidence of these permanent teeth indicate that the lower teeth of this horse lacked cement, may have an encircling cingulum on three sides, and almost complete union of the metaconid and metastylid cusps.

Classification.-- This specimen is referred to the genus Anchitherium on the basis of size and conformation of the permanent teeth. The cone-shaped metaconid-metastylid with little trace of separation, open flexids, and strong, encircling cingula (where preserved) on three sides of each tooth indicate anchitheriine-hypohippine affinity. The estimated

size of the cheek-tooth series and the size of the completely developed teeth are closest to those of A. agatense and much smaller than the corresponding dimensions of Hypohippus equinus (Osborn). The occlusal pattern shows a close similarity of the m1-2 to the unworn teeth of a referred specimen of Hypohippus affinus illustrated by Osborn (Fig. 169, 1918).

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