CONTRIBUTIONS TO PALÆONTOLOGY

VIII

ARTIODACTYLA FROM THE SESPE OF THE LAS POSAS HILLS, CALIFORNIA

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With one plate

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INTRODUCTION

The artiodactyla found at the Kew Quarry site in the Sespe deposits of the Las Posas Hills, Ventura County, California, comprise at present three forms, namely a camelid, the genus *Hypertragulus*, and possibly a bothriodont. This assemblage is again noteworthy in furnishing information of value in establishing the relationships of the Kew Quarry fauna to the John Day and White River faunal stages. At least one of these recorded forms from the Upper Oligocene extends considerably the known geographic distribution in North America of the particular group to which it belongs.

Dyscotylopus migrans n. gen. and n. sp.

Type specimen—No. 1721 Calif. Inst. Tech. Vert. Pale. Coll., a crushed skull (Plate 1, figure 1).

Diagnostic characters—Larger than known species of *Pœbrotherium*, but similar to this genus in slenderness of skull. Maxillary fossa broad. Molars compressed transversely and higher crowned than in *Pœbrotherium* or in *Paratylopus*. Outer walls of molars flatter and styles distinctly less prominent than in these genera. Mesostyle present, but does not extend full depth of crown.

Description—The type specimen of this genus is represented by a crushed skull which lacks among other parts the anterior end of the snout bearing the canines and incisors. No. 1721 evidently resembles in slenderness of skull and in size the larger species of *Pœbrotherium*. Unfortunately, because of the crushed condition, it is not always possible to determine beyond all doubt some of the major diagnostic characters, but there still remains a high degree of probability in the interpretation of the structural features as they are now revealed.

However, it is difficult to demonstrate with any degree of certainty whether the orbits were closed or open in back. Judging from the fragments which remain on the right side, the orbit may have been open as in *Pœbrotherium*, but if this is really the case the frontal process was carried downward to a considerable extent.

The wall of the face anterior to the orbit is brecciated, but the extent to which the bone fragments extend upward, toward the nasal border, makes it appear reasonably certain that the structure of the skull in this region was like that in *Pœbrotherium*. In other words, a pre-orbital vacuity may have been present, but its size may not have been as large as that of the vacuity in *Pseudolabis*. A maxillary fossa of relatively large size is clearly outlined. In this respect resemblance to *Pseudolabis* and to specimens of *Pœbrotherium* is apparent. Extent of this fossa is greater than that generally seen in skulls of the latter genus. No marked depression is evident along the median line at the anterior ends of the frontals as in the skull of *Pseudolabis dakotensis*.

Compared with the type of *Pœbrotherium andersoni* (No. 17358 Amer. Mus. Nat. Hist.) the cranial region of the skull in the Sespe species corresponds in length to the former, but the facial region is distinctly longer. The skull in No. 1721 may have been as long as that of *Paratylopus sternbergi*, but it is comparatively more slender for its size. The orbit is smaller in

our specimen and the large facial fossa noted in No. 1721 is lacking in the John Day type.

In so far as the structures can be determined, considerable similarity prevails between the Sespe species and *Pœbrotherium* in the posterior region of the skull adjacent to the external auditory meatus. Only the upper rim of this opening is preserved and the bulla is crushed and in large part broken away. The paroccipital process resembles that in *Pœbrotherium*, with the plate in front somewhat broader anteroposteriorly. Evidently a deep pit, like that in *Pœbrotherium*, was present between this process and the occipital condyle. Moreover, the condyles do not project backward beyond the level of the occiput, but have a position similar to that in the latter genus. A deep depression is present on either side of the base of the occiput above the condyles.

The lateral compression of the teeth is due in part to the crushing to which the specimen has been subjected. However, with allowance made for this crushing, the teeth in No. 1721 are relatively narrower for their length than those in *Pœbrotherium* or in *Paratylopus*. The teeth are likewise longer-crowned.

$P\underline{1}$ was two-rooted, in which respect the Sespe form agrees with *Pœbrotherium* and differs apparently from *Pseudolabis*. Matthew states that $P\underline{1}$ is caniniform in *P. dakotensis*. The diastema between $P\underline{1}$ and $P\underline{2}$ measures approximately 12 mm. in the Sespe specimen. This length is greater than in *Pœbrotherium* but, relative to length of tooth-row, perhaps no more so than in *Pseudolabis*. Only the base of the crown of $P\underline{4}$ is preserved on the right side of the skull; on the left the crown of this tooth is crushed and the enamel wall on the inner side is split. However, the type of crown present in No. 1721 would appear to resemble that in *Pœbrotherium* and to differ to this extent from that in *Pseudolabis*. The median rib of the outer face is more reduced than in the latter genera.

The molar teeth in the Sespe specimen form a longer series, the individual teeth being larger, narrower, and of a distinctly more slender appearance than in *Paratylopus sternbergi*. Furthermore, the external walls are noticeably flatter and the styles distinctly less prominent than in the latter. The compression of the teeth and the flattening of the outer walls present features that are more accentuated in *Dyseotylopus* than in *Pseudolabis*.

$M\underline{1}$ possesses a mesostyle and this is more prominently developed than in the comparable tooth of *Pseudolabis*. It is present also in $M\underline{2}$, but does not continue downward on the tooth crown to the occlusal margin.

Relationships—Dyseotylopus is evidently an advanced pœbrothere, larger and with longer-crowned, narrower cheek-teeth than in typical *Pœbrotherium* of the White River. The Sespe type is clearly distinct from *Paratylopus*. *Dyseotylopus* is not so robust as *Pseudolabis*, and in the former the reduction in size of styles and the flattening of the external walls of the upper teeth are carried even farther than similar features seen in the latter type.

It is unfortunate that, in absence of the skull, no direct comparisons can be made with the genotype of *Protomeryx*. Matthew[1] has reviewed the status of this genus and has indicated that the type, *Protomeryx halli*, described by Leidy, came from deposits which can be regarded as the equivalent

[1] W. D. Matthew, Mem. Amer. Mus. Nat. Hist., vol. 1, pt. 7, 422–423, fig. 29, 1901.

Apparently the species name *cedrensis* was also applied to this type by Matthew, for this name appears in the faunal list (*vide supra*, p. 358) and in the legend below the text-figure (p. 422, fig. 29) illustrating the type specimen of *Protomeryx campester*. Although the name *cedrensis* appears first in the text and also accompanies the figure of the type specimen of *P. campester*, it is evident that Dr. Matthew decided to use the name *campester* instead. *P. cedrensis* and *P. campester* are therefore synonymous and should not be regarded as separate species.

of the Leptauchenia and Protoceras beds. Matthew described a second species, *Protomeryx campester*, from the Leptauchenia zone of northeastern Colorado. With reference to possible relationship of *Dyseotylopus* to *Protomeryx*, it is significant to note in Matthew's description and illustration that *P. campester* possessed a large diastema behind $P\overline{1}$ and that the teeth are higher-crowned and more compressed than in *Paratylopus sternbergi*. Possibly *Dyseotylopus* and *Protomeryx* are congeneric.

Comparative measurements (in millimeters) of superior dentition

	Dyseotylopus migrans No. 1721 C.I.T.	Pseudolabis dakotensis No. 9807 A.M.N.H.	Pœbrotherium labiatum No. 6520 A.M.N.H.	Pœbrotherium andersoni No. 17358 A.M.N.H.	Pœbrotherium eximium No. 632 A.M.N.H.
Length from anterior end of $P\underline{1}$ to posterior end of $M\underline{3}$	*a*97.1	107.5	.....	71.6	73.0
Length from anterior end of $P\underline{2}$ to posterior end of $M\underline{3}$	*a*78.1	84.6	64.1	58.3	64.4
$P\underline{4}$, anteroposterior diameter	10.0	11.4	7.8	8.1	9.0
$M\underline{1}$, anteroposterior diameter	15.0	*a*15.3	11.1	10.0	10.7
$M\underline{2}$, anteroposterior diameter	19.7	18.2	13.6	11.7	13.7
$M\underline{3}$, anteroposterior diameter	20.6	19.7	14.3	12.7	13.8

a, approximate.

Hypertragulus fontanus n. sp.

Type specimen—A crushed skull with cheek-tooth series $P\underline{2}$-$M\underline{3}$ and with a portion of $P\underline{1}$ on the right side, No. 473 Calif. Inst. Tech. Vert. Pale. Coll. (Plate 1, fig. 3).

Referred specimen—Fragment of right ramus of mandible with $P\overline{1}$–$M\overline{3}$, No. 1723 C. I. T. (Plate 1, figs. 4, 4*a*).

Specific characters—In size more like *Hypertragulus calcaratus* from the White River than like *H. hesperius* from the John Day. Distinguished principally by absence of cingula in posterior upper molars and by narrowness of shelf between walls of inner crescents in these teeth. Upper premolar series, $P\underline{2}$-$P\underline{4}$, shorter in relation to length of molar series than in *H. calcaratus*.

Description—The type specimen of this species represents a fully adult individual resembling in size individuals of *H. calcaratus*. The John Day Hypertragulidæ, represented by *H. hesperius* and by *Allomeryx planiceps*, are generally larger and more progressive in this character than the earlier Oligocene forms from the White River. However, variation in this feature is evident among the John Day members of the group. Lull[1] has described *Hypertragulus minutus* from the Upper John Day, and the individual on which this species is based is actually smaller than the type from the Las Posas Hills Sespe.

$M\underline{2}$ and $M\underline{3}$ exhibit no cingula on the anterior and posterior sides of the crowns and the incipient mesostyle, seen in molars of *H. calcaratus*, is likewise absent. Moreover, the shelf forming the floor of the valley between the inner crescents is narrower anteroposteriorly than in the latter species. $P\underline{2}$ and $P\underline{3}$ are small. The diastema between $P\underline{1}$ and $P\underline{2}$ appears to be comparable in length to that observed in *H. calcaratus*.

A lower jaw fragment with teeth, referred to *Hypertragulus fontanus*, is shown in Plate 1, figures 4, 4*a*.

The Sespe species from the Kew Quarry locality comprises individuals of smaller size than those represented by specimens from the Tecuya beds of southern California. In the latter[2] the upper molars are without cingula in

[1] R. S. Lull, Amer. Jour. Sci., ser. 5, vol. 4, 115, 1922.

[2] C. Stock, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, 269–270, figs. 2 and 3, 1920.

No. 23603 Univ. Calif. Coll., but an anterior cingulum is present in the molars of No. 23598 Univ. Calif. Coll.

Measurements (in millimeters)

	Hypertragulus fontanus n. sp. Type No. 473 C. I. T.
Length of series, $P\frac{2}{2}$–$M\frac{3}{3}$	24.9
$M\frac{3}{3}$, greatest length, measured parallel to outer side	6.9
$M\frac{3}{3}$, greatest width normal to outer side	6.4

	Hypertragulus fontanus n. sp. No. 1723 C. I. T.
Length of series, $P\frac{3}{3}$–$M\frac{3}{3}$	24.8
Length of diastema in front of $P\frac{3}{3}$ (approximate)	5.2
Length of diastema behind $P\frac{2}{2}$	2.3
Depth of ramus below middle of $P\frac{3}{3}$	5.9

(?)Bothriodon cf. brachyrhynchus (Osborn and Wortman)

The possibility of an anthracothere in the fauna is indicated at present by a single fragmentary specimen. No. 1722 Calif. Inst. Tech. Vert. Paleo. Coll. (Plate 1, fig. 2) consists of a portion of the maxillary with $Dp\frac{3}{3}$ and $Dp\frac{4}{4}$. The crown of $Dp\frac{3}{3}$ is not perfectly preserved, while that of $Dp\frac{4}{4}$ is practically complete. Comparison has been made particularly with No. 579 in the collections of the American Museum of Natural History, a specimen collected in the Upper Oreodon beds of the White River group, South Dakota. Through the courtesy of Dr. F. B. Loomis a milk dentition of *Agriochærus antiquus* has also been available.

$Dp\frac{4}{4}$ in No. 1722 from the Sespe is narrower, relative to its anteroposterior diameter, than the comparable tooth in *B. brachyrhynchus*. Moreover, the parastyle is more strongly developed, while the mesostyle is weaker in our specimen than in No. 579. The anterior intermediate cusp is distinct and well developed. This tooth differs from $Dp\frac{4}{4}$ in *Agriochærus* in presence of intermediate cusp, more strongly developed anterior and posterior cingula, wider median valley, and stronger parastyle. There still remains, however, considerable resemblance between these teeth.

Unfortunately, only the posterior portion of $Dp\frac{3}{3}$ remains. In this, however, the size of the posterointernal cusp is like that in the anthracotheres. It likewise differs in shape and in position from the comparable cusp in *Agriochærus*. In the latter, the cusp has a more forward position with reference to the posteroexternal cusp than in the Sespe specimen.

Several genera and species of anthracotheres have been described from the Oligocene of North America, and it is by no means certain that the Sespe form belongs to the genus *Bothriodon* (*Ancodon*). Presence of this type in the Kew Quarry fauna is significant, particularly if it proves to be an anthracothere, since it emphasizes again the difference between the fauna from the Sespe of the Las Posas Hills and that from the John Day of eastern Oregon. These mammals remain unrecorded in the faunal assemblages from the John Day, but they can not be regarded as restricted in their vertical range to the Oligocene, since they are known to occur in the Lower Miocene (Lower Rosebud) of the western Great Plains.

Measurements (in millimeters)

	No. 1722 C.I.T.	No. 579 A.M.N.H.
$Dp\frac{4}{4}$, greatest anteroposterior diameter measured along outer side	17.4	17.3
$Dp\frac{4}{4}$, greatest transverse diameter across paracone and protocone	15.4	16.4

SUMMARY

Three artiodactyls are recorded from the Kew Quarry site (Locality 126 Calif. Inst. Tech. Vert. Pale.) of the Sespe deposits in the Las Posas Hills, Ventura County, California. These comprise a new genus and species of camel, *Dyseotylopus migrans*, a new species of *Hypertragulus*, *H. fontanus*, and possibly an anthracothere.

Dyseotylopus is more advanced than *Pœbrotherium* and differs in its structural characters from *Paratylopus* and *Pseudolabis*. The Sespe form is possibly congeneric with *Protomeryx*. In view of the close resemblance between certain mammals occurring in the Kew Quarry fauna and comparable species in the John Day, this difference between the camels from the two horizons furnishes a striking exception.