

*INSECTIVORA FROM THE SESPE UPPERMOST EOCENE,
CALIFORNIA*

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Introduction.—The insectivores now known from the uppermost Eocene stage of the Sespe (Locality 150) comprise three distinct types. The most abundant form represented at this locality is evidently related to the erinaceid genus *Proterix* from the Oreodon beds of the White River Oligocene. Associated with this type is a second genus, presumably of erinaceid affinities but known principally by an incomplete ramus of the mandible. The third genus is a member of the Leptictidae. Curiously enough, this was the first insectivore to be recognized in the fauna from Locality 150, but the type remains at present the least known of any of these forms.

***Proterixoides davisi*, n. gen. and n. sp.**

Type Specimen.—Maxillary fragment with P_3-M_2 , No. 1673 Calif. Inst. Tech. Vert. Pale. Coll., plate 1, figure 1.

Paratype.—Ramus with I_2, P_3-M_3 , No. 1676 C.I.T., plate 1, figures 4, 4a.

Referred Specimens.—Maxillary fragments with upper teeth, Nos. 1674, 1675 (plate 1, figure 3), 1356 and many fragments of rami with teeth including No. 1677 (plate 1, figure 2) and No. 1678 C.I.T.

Locality.—Brea Canyon section, Sespe deposits north of Simi Valley; Locality 150 C.I.T. Vert. Pale. Uppermost Eocene.

Generic and Specific Characters.—Dentition $\frac{? ? ?}{3} \frac{3}{1} \frac{3}{3} ? \frac{3}{3}$. P_3 larger than in *Proterix*, with internal cusp anterior in position and with shelf behind. Small cusp at anterior base of principal cusp. P_4 not molariform, but showing tendency to acquire molar crown pattern. Principal outer cusp with small posterior style and anterior basal cusp. Postero-internal portion of crown suggests incipient development of hypocone or pseudhypocone. M_1 broader anteroposteriorly than in *Ictops*, less so than in *Proterix*. Anterior molars wider transversely than in *Proterix*, particularly M_2 . Hypocone and metaconule well developed. M_3 with antero-intermediate cusp; crown more reduced than in *Ictops*, narrower anteroposteriorly and wider transversely than in *Proterix*. I_2 proclivous and larger than adjacent incisors. P_2 apparently two-rooted. P_4 short, relatively wide, with heel reduced and possessing small median cusp. Paraconid progressively smaller in first to third molar, inclusive. M_3 slightly longer

than $M\bar{2}$, but narrower. Hypoconulid in $M\bar{3}$ well developed and situated closer to entoconid than to hypoconid. This species is named for Dr. E. F. Davis, Chief Geologist of the Shell Company, California.

Comparisons.—In front of $P\bar{3}$ are two alveoli in anteroposterior alignment, with the posterior socket larger than the anterior one. $P\bar{3}$ is a noticeably larger tooth than in *Proterix* and was evidently broader internally in an anteroposterior direction. $P\bar{4}$ in *Proterixoides* was apparently wider transversely and, relative to this width, narrower anteroposteriorly than in *Proterix*. Because of the incompleteness of this tooth in the Oligocene genus it is impossible to determine certainly whether two distinct outer cusps were present as in *Ictops* or whether a single cusp and a posterior style were present as in the Sespe type. It should be recalled that while two external roots are present in $P\bar{4}$ of *Erinaceus*, the crown possesses a single large external cusp and a small posterior wing or blade. The preserved inner lobe of the tooth in *Proterix* shows the presence of a hypocone, but this cusp is not so large as that in the molar teeth. In *Proterixoides* the beginnings of a hypocone or pseudhypocone can be discerned in several specimens where the cusp shows various degrees of distinctness. Thus, when the fourth premolar in the type specimen, No. 1673, is viewed from the postero-internal side a slight vertical furrow is evident on this surface of the protocone and a portion of the postero-external wing of the protocone is swollen. On the other hand, the origin of the hypocone as a cingular cusp is best shown in No. 1674. Here the vertical furrow is in even greater evidence and the postero-internal cingulum becomes noticeably prominent.

The types of premolars represented by $P\bar{3}$ and $P\bar{4}$ show some resemblance to comparable teeth in *Tupaia*, but several differences are likewise apparent.

In the molars of *Proterixoides* the outer cusps are conic and are situated not so close to the outer margin of the tooth-crown as in *Proterix*. In addition to the metaconule an enlargement of a portion of the antero-external wing of the protocone presumably denotes the position of an anterior intermediate cuspule. The latter is not in evidence in the Oligocene form. In $M\bar{3}$ particularly, a cuspule having this position is clearly seen in *Proterixoides* (No. 1356 in which the crown is practically unworn). This specimen likewise shows a posterior intermediate cuspule.

$M\bar{1}$ and $M\bar{2}$ are broader anteroposteriorly in *Proterixoides* and *Proterix* than in *Ictops* and *Mesodectes*, particularly internally where the larger size of the hypocone adds to the anteroposterior diameter of the tooth. In *Proterixoides*, as in *Proterix*, a noticeable change in course of outer border of the cheek-tooth series occurs at a point between $M\bar{1}$ and $M\bar{2}$. This is not so apparent in *Ictops* or in *Mesodectes*, where the outer border of $M\bar{2}$ is still nearly horizontal and the deflection inward becomes more striking along the outer border of $M\bar{3}$.

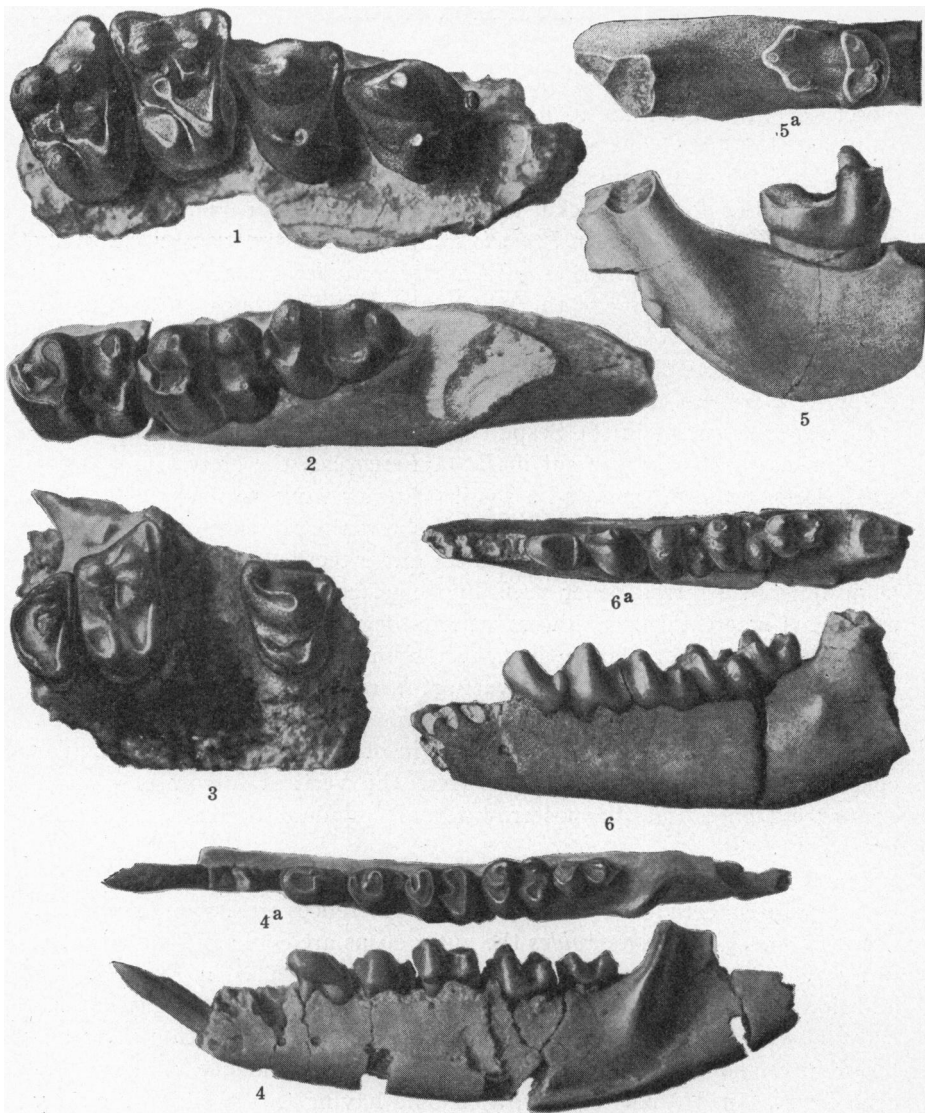


PLATE 1

Proterixoides davisii, n. gen. and n. sp.

Figure 1, type specimen, $P_3 - M_2$, No. 1673, occlusal view; $\times 5$.

Figure 2, $M_1 - M_3$, No. 1677, occlusal view; $\times 5$.

Figure 3, P_4 , M_2 and M_3 , No. 1675, occlusal view; $\times 4$.

Figures 4, 4a, paratype, No. 1676, mandibular ramus with portion of lower dentition, lateral and occlusal views; $\times 2\frac{2}{3}$.

Leptictid, probably n. gen. and n. sp.

Figures 5, 5a, No. 1679, fragment of mandibular ramus with M_3 , lateral and occlusal views; $\times 3\frac{2}{3}$.

Sespedectes singularis, n. gen. and n. sp.

Figures 6, 6a, type specimen, No. 1785, ramus of mandible with portion of lower dentition, lateral and occlusal views; approx. $\times 5$.

California Institute of Technology Collections. Sespe Uppermost Eocene, California.

$M\bar{3}$ is smaller, broader anteroposteriorly for its transverse width in *Proterix* than in *Proterixoides* and shows on its crown only the three major cusps. In the Sespe genus the metacone is considerably reduced in size in comparison to the paracone, whereas in *Proterix* the two cusps are of subequal size. The presence of the intermediate cuspules in $M\bar{3}$ of the Sespe genus has been mentioned above.

The anterior opening of the infra-orbital canal lies above $P\bar{3}$.

A number of lower jaw specimens are available, of which the paratype, No. 1676, offers the best opportunity to ascertain the number and character of the anterior teeth. All of the teeth anterior to $P\bar{3}$ are crowded. Evidently three lower incisors were present, although only the crown of $I\bar{2}$ is now preserved. This tooth is distinctly larger than either $I\bar{1}$ or $I\bar{3}$ and its attitude is proclivous. The alveolus for the canine is noticeably larger than that for the last incisor. Two root-sockets can be discerned between the alveolus for the canine and that for $P\bar{3}$, a small one in front and a larger one behind. These are interpreted to represent the position of a two-rooted $P\bar{2}$, although it is possible that each alveolus may be for a single-rooted tooth, namely $P\bar{1}$ and $P\bar{2}$.

In the paratype of *Proterixoides* the inferior border of the ramus is convex in its sweep from a point below the masseteric fossa to the anterior end. The fossa is deep and its upper anterior border, where preserved, is sharply ridged. A posterior mental foramen is situated below the middle of $P\bar{3}$ while a second opening lies slightly farther forward, below the anterior border of $P\bar{3}$.

Proterixoides differs from *Diacodon* in presence of a non-molariform $P\bar{4}$, distinctly different shape of $P\bar{3}$, and in the larger molar teeth with $M\bar{1}$ and $M\bar{2}$ relatively longer anteroposteriorly in comparison to their width. Moreover, the hypocone is larger in these molars and the principal external cusps are farther removed inwardly from the external border of the teeth. In the lower molars the trigonids are lower and less compressed. In $P\bar{4}$ the heel is considerably more reduced than in *Diacodon*. $P\bar{3}$ is without a basal cuspule, but possesses an inner style or ridge.

Relationships.—Among known fossil forms *Proterixoides* appears to be most closely related to the Oligocene genus *Proterix*. Resemblance to the latter type is greater than that which prevails between the Uppermost Eocene genus and the Old World erinaceids of the Miocene and Oligocene. Although regarded as ancestral to *Proterix*, the Sespe genus does not serve to bring the erinaceids and the Leptictidae more closely together than does the former type. Characters displayed by the posterior premolars may be taken to indicate an approach toward the Tupaioidae. Resemblance to the type of dentition seen in *Anagale* is apparent, but in the face of the present inadequate basis of comparison an extended statement of possible relationship to the Anagalidae seems hardly warranted.

COMPARATIVE MEASUREMENTS (IN MILLIMETERS)

	<i>Proterixoides</i> <i>Davisi</i> Type No. 1674 C. I. T.	<i>Proterix</i> <i>Loomisi</i> Type No. 9756 A. M. N. H.
Length from anterior end of $P\bar{3}$ to posterior end of $M\bar{3}$	a 13.3	a 14.4
Length of molar series	8.1	8.3
$M\bar{1}$, transverse diameter	3.6	5
$M\bar{1}$, anteroposterior diameter	4.5	3.3
$M\bar{2}$, greatest transverse diameter	3.8	4.9
$M\bar{2}$, anteroposterior diameter	2.8	3.1
$M\bar{3}$, greatest transverse diameter	2.9	3.5
$M\bar{3}$, anteroposterior diameter	2	1.8
$P\bar{3}$, transverse diameter	3	2.9
$P\bar{3}$, anteroposterior diameter	3.5	...
$P\bar{4}$, transverse diameter	3.9	4.1
$P\bar{4}$, anteroposterior diameter	3.3	3.5
	Paratype No. 1676	
Length from anterior end of $P\bar{3}$ to posterior end of $M\bar{3}$	a 16.4	

a Approximate.

Sespedectes singularis, n. gen. and n. sp.

Type Specimen.—No. 1785 Calif. Inst. Tech. Coll. Vert. Pale., incomplete left ramus with $P\bar{3}$ – $M\bar{3}$, plate 1, figures 6, 6a.

Characters.—Differs from Old World Tertiary erinaceids in more nearly equal size of first and second molars, more reduced paraconid, and presence of hypoconulid in $M\bar{3}$. Differs from *Proterixoides* in much smaller size, $P\bar{3}$ more reduced in size, in relation to $P\bar{4}$, and with inner posterior cuspule or ridge on principal cusp absent; $M\bar{3}$ more reduced in size, relative to size of anterior molars.

Remarks.—This tiny insectivore from Locality 150 is distinctly smaller than *Proterixoides* and decidedly less abundant in the collections. $P\bar{3}$ in *Proterixoides* is only slightly smaller than $P\bar{4}$ and its crown carries a tubercle or ridge on the postero-internal side of the principal cusp, a backward continuation of which extends to the inner posterior corner of the tooth. In *Sespedectes*, on the other hand, $P\bar{3}$, in relation to $P\bar{4}$, is more reduced in size, the postero-internal ridge or tubercle is lacking, and the heel has a somewhat different appearance. Furthermore, $P\bar{4}$ differs not only from the comparable tooth in *Proterixoides* in basal outline but also in the fact that the highest point on the posterior rim or heel is reached on the inner side of the tooth. In the larger form the highest point is reached nearer the median anteroposterior axis.

The cheek-teeth are crowded and the trigonid of the individual molar overlaps the posterior end of the tooth in front. $M\bar{3}$, relative to the size

of $M\bar{2}$, is a smaller tooth than in *Proterixoides*. It resembles the latter in the presence of a hypoconulid. Several alveoli are shown in the jaw anterior to $P\bar{3}$ indicating that the anterior teeth were crowded. In addition to the two root-sockets presumably for $P\bar{2}$, three alveoli are present, and a full complement of anterior teeth was apparently not represented. A single mental foramen is shown, situated below $P\bar{2}$.

In the type of *Entomolestes grangeri* from the Bridger the molars have the paraconid much more prominently developed than in the Sespe genus; summit of the entoconid in the molars is more marginally situated; $M\bar{3}$ placed farther forward with reference to the anterior border of the ascending ramus; the mental foramen situated farther posteriorly.

Length from anterior end of $P\bar{3}$ to posterior end of $M\bar{3}$ in No. 1785 is 7.3 mm.

Leptictid, probably n. gen. and n. sp.

Specimen.—Small fragment of right ramus with $M\bar{3}$, No. 1679 C.I.T. Coll. Vert. Pale., plate 1, figures 5, 5a.

Description.—Unfortunately, this type is known only by the specimen indicated above. The jaw was evidently larger and heavier than in *Ictops* or in *Protictops*. The last lower molar resembles the comparable tooth in leptictids in the high, anteroposteriorly compressed trigonid and in the shape of the talonid. This tooth is considerably larger than $M\bar{3}$ of *Ictops* and presumably differed in this regard also from the comparable tooth in Peterson's genus *Protictops* from the Duchesne River horizon. The paraconid is small, low, and situated on the middle anteroposterior axis of the tooth. A short cingulum is present along the anterior base of the trigonid. The heel is noteworthy because of its length. Judging from the characters of the heel in the anterior molars of *Protictops*, the talonid in the last molar probably was considerably shorter than in the tooth of the Sespe genus. The cusps on the heel in No. 1679 are worn, but it is evident that the hypoconid was a more robust cusp than the entoconid and situated not so far posteriorly as the latter. The hypoconulid has a position on the middle anteroposterior axis of the tooth.

In the characters of $M\bar{3}$ the Sespe form shows greater resemblance to *Diacodon* and to *Leptictis* and *Mesodectes* than to *Ictops* or *Protictops*.

Length of $M\bar{3}$ in No. 1679 is 4.1 mm.