

CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

THE UNIVERSITY OF MICHIGAN

VOL. 26, NO. 3, p. 37-47 (4 text-figs.)

December 21, 1982

---

***AAPTORYCTES* (PALAEORYCTIDAE) AND *THELYSIA*  
(PALAEORYCTIDAE?): NEW INSECTIVOROUS MAMMALS FROM  
THE LATE PALEOCENE AND EARLY EOCENE OF  
WESTERN NORTH AMERICA**

BY

PHILIP D. GINGERICH



MUSEUM OF PALEONTOLOGY  
THE UNIVERSITY OF MICHIGAN  
ANN ARBOR

## CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

Philip D. Gingerich, Director

Gerald R. Smith, Editor

This series of contributions from the Museum of Paleontology is a medium for the publication of papers based chiefly upon the collection in the Museum. When the number of pages issued is sufficient to make a volume, a title page and a table of contents will be sent to libraries on the mailing list, and to individuals upon request. A list of the separate papers may also be obtained. Correspondence should be directed to the Museum of Paleontology, The University of Michigan, Ann Arbor, Michigan, 48109.

VOLS. II-XXVI. Parts of volumes may be obtained if available. Price lists available upon inquiry.

**AAPTORYCTES (PALAEORYCTIDAE) AND THELYSIA (PALAEORYCTIDAE?):  
NEW INSECTIVOROUS MAMMALS FROM THE LATE PALEOCENE AND  
EARLY EOCENE OF WESTERN NORTH AMERICA**

BY

PHILIP D. GINGERICH

*Abstract.*—Two new genera and species of Paleocene and Eocene insectivorous mammals are described from northwestern Wyoming. Late Tiffanian *Aaptoryctes ivyi* is an unusual palaeoryctid differing from its closest Paleocene relatives, species of *Palaeoryctes* and *Pararyctes*, in being larger and in having expanded crushing premolar teeth. It is known from three localities in the northern Bighorn Basin, Clark's Fork Basin, and Hoback Basin, respectively. Middle Clarkforkian *Thelysia artemia* is a distinctive earliest Eocene species that appears to be most closely related to middle Paleocene *Leptonysson basiliscus*. *Thelysia* is known only from the Clark's Fork Basin. Lower molars of *Thelysia* and *Leptonysson* resemble those of *Palaeoryctes* in having broad high trigonids and narrow talonids that lack entocristids. *Thelysia* has some characteristics of early Cenozoic Pantolestidae, but it is provisionally referred to the family Palaeoryctidae because of its resemblance to *Leptonysson*.

INTRODUCTION

The systematic relationships of early Cenozoic insectivorous mammals are poorly understood. This is due in part to the diversity and complex evolutionary history of insectivorous mammals in general, and it is due in part to the small body size and tooth size of insectivores, making them difficult to discover and collect. The two new genera described here, one clearly a palaeoryctid and the other provisionally referred to this family, add significantly to the known diversity of Palaeoryctidae but contribute little to understanding the systematic position of palaeoryctids in relation to other insectivores. The genera and species described here represent animals of relatively large body size, and their discovery after more than fifty years of intensive research on late Paleocene and early Eocene faunas probably indicates that they were originally rare faunal elements or that they have very restricted stratigraphic ranges (or both).

The insectivores described here were collected during the course of an ongoing program of study of mammalian faunal evolution across the Paleocene-Eocene boundary in the Clark's Fork Basin and contiguous parts of the northern Bighorn Basin, Wyoming. The Bighorn, Clark's Fork, and Crazy Mountain Basins are parts of one structural basin that are drained today by different river systems. In the Paleocene and early Eocene, all three were probably parts of a single drainage basin and all three probably shared a similar mammalian fauna. The history of study of mammalian faunas from the Clark's Fork and Bighorn Basins is outlined in Gingerich (1980), and the biostratigraphy and faunal history of Tiffanian and Clarkforkian

mammals in the Clark's Fork and Bighorn Basins are summarized in Gingerich et al. (1980) and Rose (1981).

Nomenclature used to describe the teeth of insectivores follows that proposed by Van Valen (1966). Institutional abbreviations used in this paper are as follows: AMNH, American Museum of Natural History (New York); CM, Carnegie Museum of Natural History (Pittsburgh); PU, Princeton University Natural History Museum (Princeton); and UM, University of Michigan Museum of Paleontology (Ann Arbor).

## SYSTEMATIC PALEONTOLOGY

The family Palaeoryctidae is a group of archaic Late Cretaceous and early Cenozoic zalambdodont insectivores of uncertain relationship to other insectivorous mammals. Romer (1966) and Van Valen (1966, 1967) placed Palaeoryctidae in the order Creodonta or "Del-tatheridia," but most subsequent authors have included them in an admittedly artificial order or suborder Proteutheria (e.g., Butler, 1972; Novacek, 1976; Rose, 1981; Bown and Schankler, 1982). McKenna (1975) regarded palaeoryctines as "ernotheres" (along with elephant shrews and lagomorphs), and classified them in a new ordinal category Kennalestida. Szalay (1977) included palaeoryctines in the family Leptictidae, which he placed in a new order Leptictomorpha. Thus the phyletic history and systematic relationships of Palaeoryctidae remain somewhat uncertain. The specimens described here do not contribute any new information bearing on the phylogeny of insectivores, and the general problem of insectivore classification is beyond the scope of this paper. For present purposes it is sufficient that Palaeoryctidae be included in a broadly construed order Insectivora.

Order INSECTIVORA Bowdich, 1821 (*s. l.*)

Family PALAEORYCTIDAE Winge, 1917

Subfamily PALAEORYCTINAE Winge, 1917

### **Aptoryctes**, new genus

Cf. *Gelastops*, Dorr, 1958, p. 1226. Van Valen, 1966, p. 15.

*Type species*.—*Aptoryctes ivyi*, new species.

*Included species*.—Type species only.

*Age and distribution*.—Late Paleocene (late Tiffanian Land-Mammal Age) of western North America.

*Diagnosis*.—Resembles the palaeoryctine *Palaeoryctes* in having simple zalambdodont upper molars with a broad styler shelf, connate paracone and metacone, and no precingulum or postcingulum, and lower molars with broad high trigonids and narrow talonids. Differs markedly from *Palaeoryctes* and all other Palaeoryctidae in having enlarged crushing premolar teeth.

*Etymology*.—*Aptos*, invincible, and *oryctes* (Gr., masc.), digger; in allusion to the robust anterior teeth of this large palaeoryctine, and its probable close relationship to the fossorial genus *Palaeoryctes*.

***Aptoryctes ivyi*, new species**

Text-figs. 1-3

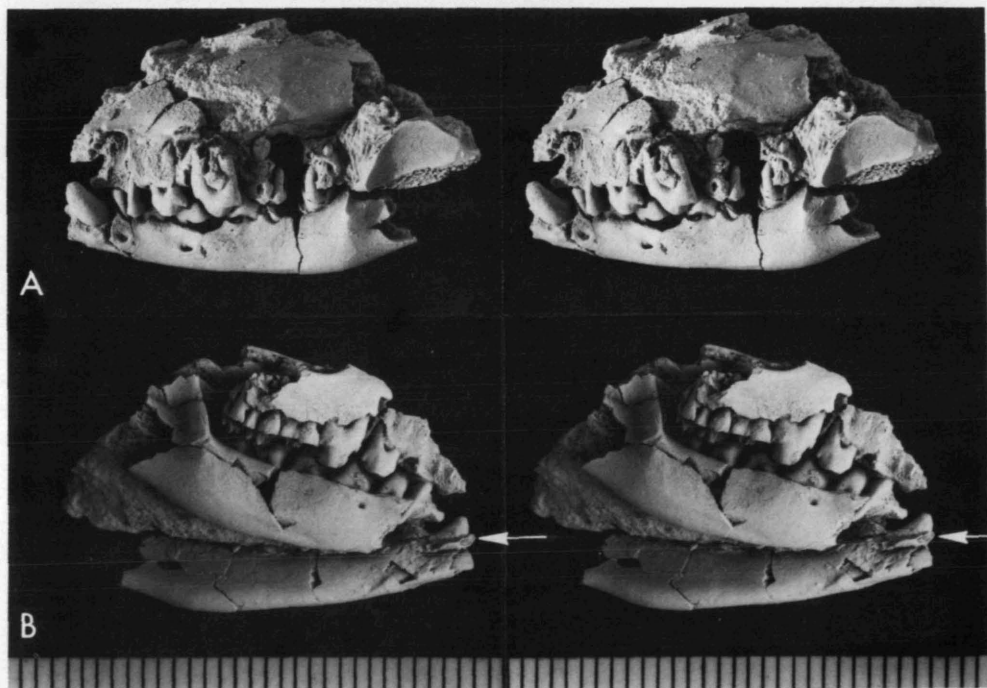
Cf. *Gelastops parvus*, Dorr, 1958, p. 1226.Cf. *Gelastops* sp. B, Van Valen, 1966, p. 15, fig. 4.

**Holotype.**—UM 77291, crushed anterior portion of skull with most of the upper and lower dentition intact (Text-fig. 1).

**Type locality.**—University of Michigan locality FG-47 in the Fort Union ("Polecat Bench") Formation of the northern Bighorn Basin, NW ¼, NE ¼, Sec. 1, T54N, R96W, Big Horn County, Wyoming.

**Age and distribution.**—Late Paleocene (late Tiffanian Land-Mammal Age) of northwestern Wyoming. All specimens found to date are from the latest Tiffanian *Plesiadapis simonsi* Zone of Gingerich (1976). *Plesiadapis simonsi* has not been found at the type locality, but it is known from a slightly higher stratigraphic level some 400 m to the southwest (UM 77302, from locality FG-48). *Aptoryctes ivyi* is known from one locality in the Clark's Fork Basin and one locality in the Hoback Basin in addition to the type locality.

**Hypodigm.**—Holotype; UM 77923, a right dentary fragment with M<sub>2</sub>, and PU 20512 (in part), an isolated right M<sub>2</sub>, both from Fossil Hollow (UM locality SC-198) on the west side of Polecat Bench in the Clark's Fork Basin, Wyoming; CM 8802, an isolated right M<sub>3</sub>, and CM 8890, an isolated right M<sub>2</sub>, both from Dell Creek Quarry (UM locality Sub-Wy-1) in the Hoback Basin, Wyoming.



TEXT-FIG. 1 — Holotype of *Aptoryctes ivyi* (UM 77291) before the upper and lower jaws were separated. Stereophotographs of left lateral view (A) and right lateral view (B). Arrow points to the alveolus for I<sub>1</sub> in a fragment of the right dentary attached to the medial surface of the left dentary. Reproduced twice natural size (scale in mm).

*Etymology*.—Named for Mr. Logan D. Ivy, who found the holotype while prospecting in an area of very poorly fossiliferous late Tiffanian sediments.

*Diagnosis*.—As for the genus.

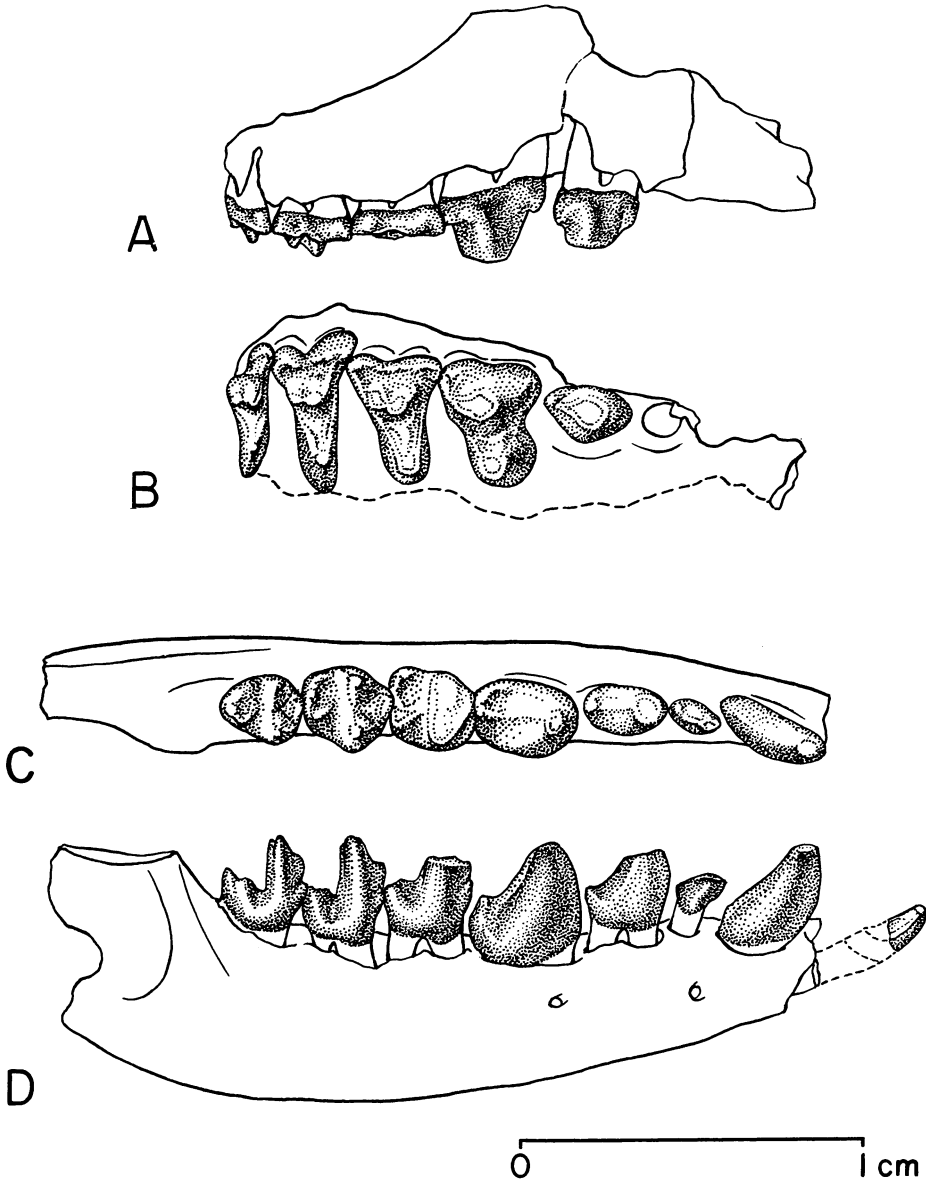
*Description*.—The holotype is the most complete specimen of *Aaptoryctes ivyi* known, and the following description is based entirely on this specimen (UM 77291). When originally found, the holotype included much of the snout with both dentaries in place in occlusion with the maxillary teeth (Text-fig. 1). The dentaries were removed during preparation to expose the crowns of all cheek teeth. The only detail of cranial anatomy worthy of note is the infraorbital foramen, which is well preserved on the right side of the snout and measures 1.6 mm in height and 1.1 mm in breadth. Both premaxillae are missing, and the number of upper incisors cannot be determined. Alveoli are preserved for an upper canine in each maxilla, and roots are present indicating that *Aaptoryctes* had three lower incisors in each dentary. The remainder of the dentition is represented by an intact crown on one side or the other (or both), and the full dental formula is  $\frac{?}{3} \frac{1}{1} \frac{3}{3} \frac{3}{3}$ .

Judging from its alveolus, the upper canine was a large, single-rooted, vertically implanted tooth, with a root measuring approximately 2.2 mm in length and 1.2 mm in width. P<sup>2</sup> is a small single-rooted tooth with a simple pointed crown. P<sup>3</sup> is similar to P<sup>2</sup> but it is larger, it has a more triangular crown, and it has three roots (Text-fig. 2A, B). There is a very small accessory cusp at the posterior edge of P<sup>3</sup>. The crown of P<sup>4</sup> is shaped like an hourglass, with the larger labial portion supported by two roots and the smaller lingual portion supported by a single root. The labial part of the tooth has a very large, simple, conical central cusp (paracone?), with small anterior and posterior accessory cusps. The lingual part of P<sup>4</sup> also has a large, simple, conical central cusp (protocone), but this cusp is not as large as the principal labial cusp, and there are no accessory cusps on the protocone. The only crests on P<sup>4</sup> are a short postparacrista connecting the paracone(?) to its posterior accessory cusp, and a faint postprotocrista. There is a faint paracingulum, and a short ectocingulum on the posterior part of the paracone(?). The principal cusps on all of the premolars are blunted by flat apical wear.

The upper molar series is preserved intact on the right side (Text-fig. 2A, B). As is typical of zalambdodont upper molars, the protocone is a high narrow cusp well separated from the paracone and metacone on all three molars. The paracone and metacone are connate, being fused for all of their preserved height. There is a broad stylar shelf on all three molars, with a very large parastyle on M<sup>1-3</sup> and a slightly smaller metastyle on M<sup>1-2</sup>. There appears to have been a small paraconule and metaconule near the protocone on M<sup>2</sup>, and these were probably present on M<sup>1</sup> and possibly present on M<sup>3</sup> before they were obliterated by wear. There is a trace of a precingulum on M<sup>1</sup>, but otherwise the molars lack pre- and postcingula. M<sup>2</sup> differs from M<sup>1</sup> in being shorter and relatively broader, and M<sup>3</sup> is even shorter with a reduced metacone and no metastyle. All of the principal cusps on the molars, especially those on M<sup>1</sup>, are blunted by wear.

A composite drawing of the right dentary, with the anterior part of the jaw added from the left side, is shown in Text-figure 2C, D. There are two mental foramina, one directly below P<sub>2</sub>, and the second slightly anterior to and below P<sub>4</sub>. The dentary is relatively shallow, measuring 5.0 mm in depth below both M<sub>1</sub> and M<sub>2</sub>. The symphysis between left and right dentaries was unfused.

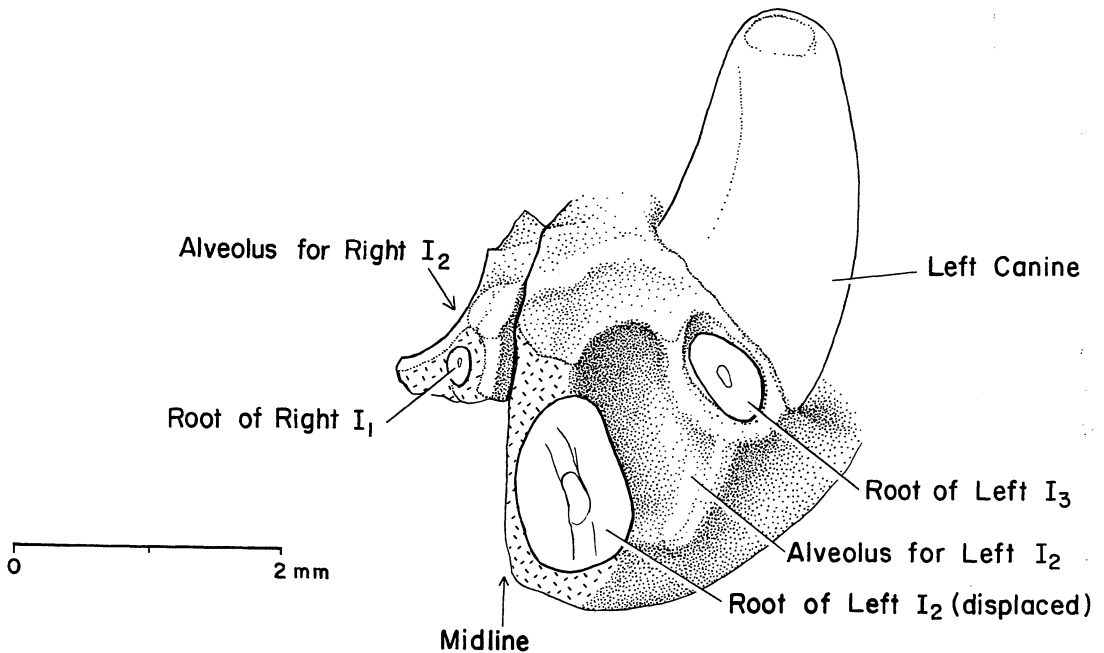
The conformation of incisor roots in the dentary of *Aaptoryctes* is shown in Text-figure 3. The root of I<sub>1</sub> is preserved in a small fragment of the right dentary that became attached to the medial surface of the left dentary during fossilization; it measures 0.3 by 0.2 mm in diameter. The root of I<sub>2</sub> in the left dentary itself is displaced medially, obliterating any trace of I<sub>1</sub>. The root of I<sub>2</sub> measures 1.3 by 0.9 mm in diameter. The root of I<sub>3</sub> is preserved in place in an alveolus just in front of the lower canine; it measures 0.8 by 0.5 mm in diameter. Thus I<sub>2</sub> was clearly the largest incisor, and I<sub>1</sub> the smallest. The anterior part of the crown of right I<sub>2</sub> is preserved as an isolated tooth fragment (Text-fig. 2D). It has a pointed tip, and the crown itself consists of a central



TEXT-FIG. 2 — Holotype of *Aaptoryctes ivyi* (UM 77291) after separation of the upper and lower jaws. (A) lateral view, and (B) occlusal view, of right maxilla with an alveolus for  $P^2$  and crowns for  $P^3$   $^4M^1$   $^3$ . (C) occlusal view, and (D) lateral view, of right dentary with part of the crown of  $I_2$  and intact crowns of  $C_1$   $P_{3,4}$   $M_{1,3}$  (lower canine reversed from left ramus). Apices of all of the anterior teeth as far back as  $M_1^1$  are blunted by flat wear facets. The lateral surface of  $I_2$  is also heavily worn.

anteroposteriorly directed rib bordered medially and laterally by smaller crests. The lateral surface of the central rib and the lateral crest are heavily worn.

The lower canine (Text-fig. 2C, D) is a single-rooted tooth with a slightly procumbent crown. The crown itself is simple and blunt, with a small apical wear facet.  $P_2$  is single-rooted, and the



TEXT-FIG. 3 — Oblique anterior view of roots for the lower incisors in *Aptoryctes ivyi* (UM 77291, holotype). Note that the root of the left I<sub>2</sub> is displaced medially, obscuring the position of I<sub>1</sub> in the left ramus. The root of I<sub>1</sub> is preserved below the alveolus for I<sub>2</sub> in a fragment of the right mandibular ramus adhering to the left dentary at the midline.

crown has a single principal cusp with a small posterior accessory cuspule. P<sub>3</sub> and P<sub>4</sub> are both double-rooted, and both have a large and inflated central cusp (protoconid) with no trace of an accessory paraconid or metaconid. There is a small accessory cusp at the base of the crown behind the protoconid on P<sub>3</sub>, and P<sub>4</sub> has a small basined talonid with distinct hypoconid and entoconid cusps. None of the premolars have any trace of a cingulid, and all have apical cusps blunted by wear.

The lower molars all have broad trigonids and narrower talonids, and the trigonids become progressively relatively shorter anteroposteriorly from M<sub>1</sub> to M<sub>3</sub>. All three molars are high crowned, although the trigonid cusps on M<sub>1</sub> are blunted by wear and their original heights cannot be estimated. The protoconid and metaconid are the principal trigonid cusps, and the protocristid ("protolophid" of Van Valen, 1966) connecting these makes a right angle in the notch between them. The paraconid is reduced and it projects no higher than the base of the protocristid notch. The paraconid is more a part of the paracristid ("paralophid") than a distinct cusp. A distinct hypoconid, hypoconulid, and entoconid are present on the talonid, enclosing a small basin that is open medially. There is a small anterior cingulid on all three lower molars, but there is no labial cingulid.

Measurements of upper and lower teeth of *Aptoryctes ivyi* are given in Table 1.

*Discussion.*—Fragmentary specimens of *Aptoryctes* have previously been compared with the didelphodontine palaeoryctid *Gelastops* (Dorr, 1958; Van Valen, 1966), but the holotype



TABLE 1 — Measurements of upper and lower teeth of late Tiffanian *Aptoryctes ivyi*, new genus and species. CM 8890, a right M<sup>2</sup> from Dell Creek Quarry, is too badly broken to permit accurate measurement. L = crown length, W = crown width, H = crown height (measured from the base of the crown above the anterior root, or at the front of the crown on the lower canine). Asterisks indicate measurements estimated on slightly worn teeth. All measurements in mm.

Upper dentition			Lower dentition				
Tooth position	UM 77291 (Holotype) UM loc. FG-47		Tooth position	UM 77291 (Holotype) UM loc. FG-47	CM 8802 Dell Creek Quarry	PU 20512 (in part) Fossil Hollow (SC-198)	UM 77923 Fossil Hollow (SC-198)
C <sup>1</sup>	L	—	L	2.4	—	—	—
	W	—	C <sub>1</sub> W	1.4	—	—	—
			H	3.5	—	—	—
P <sup>2</sup>	L	1.4	P <sub>2</sub> L	1.7	—	—	—
	W	1.1	W	1.0	—	—	—
P <sup>3</sup>	L	2.4	P <sub>3</sub> L	2.6	—	—	—
	W	1.9	W	1.6	—	—	—
P <sup>4</sup>	L	3.3	L	3.3	—	—	—
	W	4.2	P <sub>4</sub> W	2.3	—	—	—
			H	3.8*	—	—	—
M <sup>1</sup>	L	3.0	L	2.7	—	—	—
	W	4.1	M <sub>1</sub> W	2.5	—	—	—
			H	—	—	—	—
M <sup>2</sup>	L	2.5	L	2.5	—	2.3	—
	W	4.8	M <sub>2</sub> W	2.6	—	2.1	2.3
			H	3.5*	—	3.1	—
M <sup>3</sup>	L	1.7	L	2.5	2.6	—	—
	W	4.3	M <sub>3</sub> W	2.0	2.0	—	—
			H	3.0	2.8	—	—

described here shows that the two genera differ in many characteristics. In the lower dentition, *Aptoryctes* differs from *Gelastops* in lacking P<sub>1</sub>, in having a more bulbous P<sub>3</sub> and P<sub>4</sub>, and in having relatively shorter and broader lower molars. The upper molar referred to *Gelastops* by Simpson (1937) and Van Valen (1966, Pl. 2: fig. 4, 5) is probably M<sup>2</sup> of a palaeoryctine rather than a didelphodontine, but it differs from *Aptoryctes* in having a more deeply invaginated ectoflexus.

Matthew (1913, p. 309–310), in describing *Palaeoryctes puercensis*, noted an alveolus for a large procumbent or semiprocumbent tooth that he identified (correctly) as I<sub>2</sub>. The specimen available to him was too poorly preserved to indicate the presence of I<sub>1</sub> or I<sub>3</sub>, but Matthew observed that I<sub>3</sub>, if present, was smaller than I<sub>2</sub>. A specimen of *Palaeoryctes* cf. *punctatus* collected subsequently, PU 17806 from Princeton Quarry, has the crown of I<sub>2</sub> and the root of I<sub>3</sub> in place, and it has a very small depression medial to the root of I<sub>2</sub> that may be the alveolus for I<sub>1</sub>. The crown of I<sub>2</sub> is procumbent and pointed, with a central anteroposteriorly oriented rib bordered by medial and lateral crests as described above in *Aptoryctes*. The conformation of the crown of I<sub>2</sub> and relative sizes of the lower incisors in *Palaeoryctes* are very similar to those in *Aptoryctes*. The dental formula and the anterior dentition of *Aptoryctes*, along with its close similarity in molar morphology, leaves little doubt that this genus belongs in the subfamily Palaeoryctinae with *Palaeoryctes* and *Pararyctes*.

Van Valen (1966, p. 56–57) described an associated humerus suggesting that *Palaeoryctes* was built like a fossorial burrowing mammal. While there is no direct evidence to support such a

habitus for *Aptoryctes*, its close relationship to *Palaoryctes* makes this a reasonable conjecture.

Family PALAEORYCTIDAE(?), *incertae sedis*

**Thelysia**, new genus

Cf. *Palaeosinopa*, Rose, 1981, p. 37.

*Type species*.—*Thelysia artemia*, new species.

*Included species*.—Type species only.

*Age and distribution*.—Earliest Eocene (middle Clarkforkian Land-Mammal Age) of western North America.

*Diagnosis*.—Resembles *Leptonysson* in having a shallow mandibular ramus; lower molars with broad high trigonids and narrow talonids; paraconid much lower than the protoconid and metaconid on molar trigonids; hypoconid, hypoconulid, and entoconid distinct on molar talonids with the hypoconulid narrow (especially on M<sub>3</sub>); and no entocristids in front of molar entoconids, leaving the talonids open lingually. *Thelysia* differs from *Leptonysson* in having a relatively larger P<sub>4</sub> (judging from alveoli), less high crowned lower molars, relatively broader talonids (especially on M<sub>1</sub> and M<sub>2</sub>), and a posterior mental foramen below M<sub>1</sub> rather than P<sub>4</sub>. *Thelysia* resembles *Palaeosinopa* in the relative proportions of trigonid and talonid on M<sub>1</sub> and in having the posterior mental foramen below M<sub>1</sub>. It differs from *Palaeosinopa* in having a shallower mandibular ramus; anteroposteriorly shorter, higher trigonids with reduced paraconids; and narrower talonids (especially on M<sub>2</sub> and M<sub>3</sub>) that lack entocristids and are open lingually.

*Etymology*.—*Thelys* (Gr., fem.), of or belonging to women; in reference to the history of discovery of the type specimen. The first part, a right mandibular ramus with M<sub>1-2</sub>, was found in 1977 by Katy N. Sippel. In an attempt to find more of the specimen, the original locality was revisited in 1980 and Margaret J. Schoeninger found the left mandibular ramus with M<sub>1-3</sub> and the right M<sub>3</sub>.

**Thelysia artemia**, new species

Text-fig. 4

Cf. *Palaeosinopa lutreola*, Rose, 1981, p. 37, fig. 10.

*Holotype*.—UM 68281, left mandibular ramus with roots for P<sub>3-4</sub> and crowns of M<sub>1-3</sub>, right mandibular ramus with crowns of M<sub>1-3</sub>.

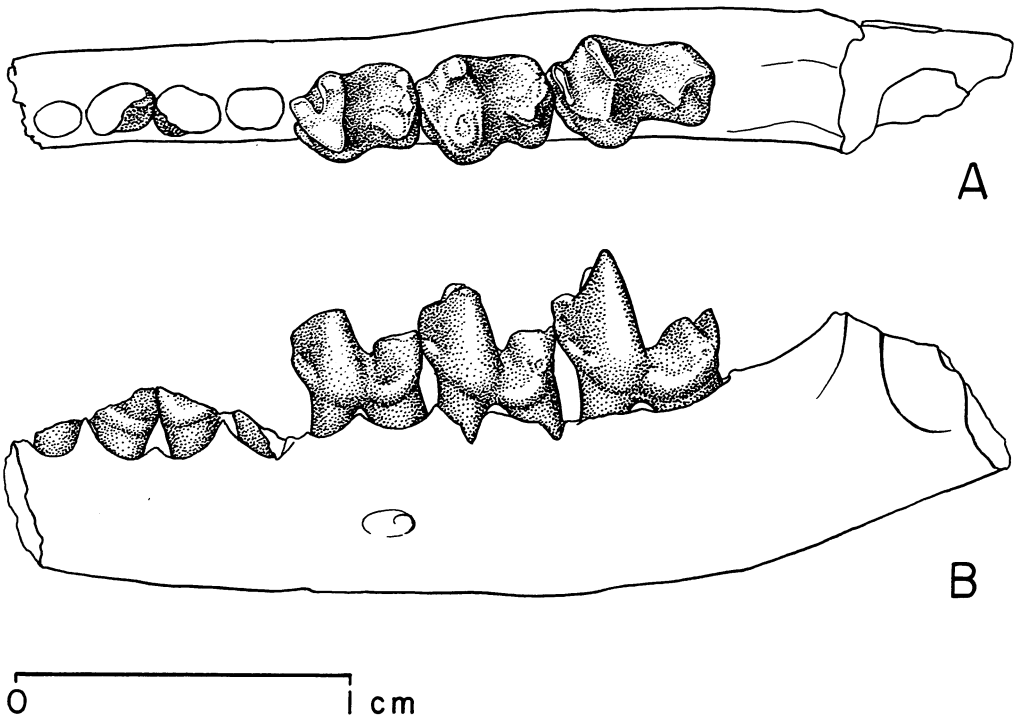
*Type locality*.—University of Michigan locality SC-167 in the Willwood Formation of the Clark's Fork Basin, SW ¼, SW ¼, Sec. 3, T57N, R102W, Park County, Wyoming. This locality is almost exactly two miles straight north of the settlement of Clark, Wyoming.

*Age and distribution*.—Earliest Eocene (middle Clarkforkian Land-Mammal Age; *Plesiadapis cookei* Zone of Gingerich, 1976). *Plesiadapis cookei* has not actually been found at SC-167, but it is known from a locality, SC-166, just west of and stratigraphically slightly higher than SC-167. *Thelysia artemia* is known only from the type locality.

*Etymology*.—Named for *Artemis*, Greek goddess of the chase, in appreciation of success in the search for additional remains of the holotype, and in allusion to the probable hunting habits of this insectivorous species.

*Diagnosis*.—As for the genus.

*Description*.—The holotype consists of left and right dentaries with M<sub>1-3</sub> on each side. No



TEXT-FIG. 4 — Holotype of *Thelysia artemia* (UM 68281), left dentary with roots of  $P_{3,4}$  and crowns of  $M_{1,3}$ . (A) occlusal view, and (B) lateral view. Trigonid of  $M_3$  reversed from right side.

upper teeth are known, and the lower premolars are known only from the broken bases of  $P_3$  and  $P_4$  (Text-fig. 4). The mandibular ramus is shallow, measuring 5.7 mm in depth below both  $M_1$  and  $M_2$ . A distinct mental foramen is present below the posterior root of  $M_1$  in both dentaries.

Judging from roots and preserved fragments of the base of each crown,  $P_3$  and  $P_4$  were relatively long and narrow teeth.  $P_3$  has a distinct keel at the posterior end of the crown that is very similar to this feature in *Leptonysson*.  $P_4$  was clearly a relatively larger tooth in *Thelysia* than in *Leptonysson*.

$M_1$  is best preserved in the left ramus of UM 68281; it appears to be slightly foreshortened anteroposteriorly in the right ramus, and the talonid of the right  $M_1$  shows signs of microfracturing. The principal cusps of the trigonid are all moderately worn on  $M_1$ , but it is clear that the paraconid was lower than the protoconid and metaconid. The paraconid is placed slightly more anteriorly on  $M_1$  than it is on the following molars, and there is no metacristid connecting the paraconid and metaconid. The talonid is nearly as broad as the trigonid, and it has distinct hypoconid, hypoconulid, and entoconid cusps enclosing a rather deep talonid basin. There is no entocristid in front of the entoconid and this basin is open lingually. Viewed from the labial side, the hypoconid is a massive, pillar-like cusp.  $M_1$  measures 3.8 mm in total length, 2.0 mm in trigonid length, 2.7 mm in trigonid width, and 2.6 mm in talonid width.

$M_2$  is similar to  $M_1$  but larger. The trigonid is more constricted anteroposteriorly relative to crown length, the talonid is narrower compared to the trigonid, and  $M_2$  appears to have been higher crowned than  $M_1$  (although this cannot be measured precisely because of apical wear on

the trigonid cusps).  $M_2$  measures 4.1 mm in total length, 2.0 mm in trigonid length, 3.3 mm in trigonid width, and 2.8 mm in talonid width.

$M_3$  is well preserved in both left and right rami, and all cusps are intact and little worn on the right  $M_3$ . The trigonid is more constricted anteroposteriorly relative to crown length than on  $M_1$  or  $M_2$ . The talonid is both absolutely and relatively narrower.  $M_3$  is clearly higher crowned than either  $M_1$  or  $M_2$ . The protocristid ("protolophid" of Van Valen, 1966) has an acute-angled notch equidistant from the protoconid and metaconid, and the crest-like paraconid is only slightly higher than the base of this protocristid notch. The pillar-like form of the hypoconid is exaggerated on  $M_3$ , and the hypoconulid has a distinctly pinched appearance, making an acute projection behind the hypoconid and entoconid. The protocristids are oriented progressively more oblique to the mandibular ramus, and this is most pronounced on the last molar.  $M_3$  measures 4.5 mm in crown length, 2.0 mm in trigonid length, 3.3 mm in trigonid width, 2.5 mm in talonid width, and 4.6 mm in crown height measured from the base of the trigonid to the tip of the protoconid on  $M_3$ .

*Discussion.*—The relationship of *Thelysia* to other archaic insectivores is not very clear. Rose (1981, p. 37) compared UM 68281 with *Palaeosinopa lutreola*, but he also noted that the relatively high trigonids and absence of an entocristid suggest palaeoryctid affinities. Additional parts of UM 68281 found in 1980, subsequent to Rose's study, tend to reinforce the latter suggestion.

Van Valen (1967) described *Leptonysson basiliscus* from Gidley Quarry, a locality of middle Paleocene age (Torrejonian Land-Mammal Age) in the eastern Crazy Mountain Basin, a northward extension of the Bighorn-Clark's Fork structural basin. This genus and species is still only known from a single specimen, the holotype AMNH 35295. Van Valen assigned *Leptonysson* to the subfamily Procerberinae of the family Leptictidae. *Procerberus* has since been transferred from Leptictidae to Palaeoryctidae (Lillegraven, 1969, p. 69), and Clemens (1973, p. 29–30) has assigned *Leptonysson* to Palaeoryctidae as well. *Thelysia* is similar to *Leptonysson* in many ways, and for this reason *Thelysia* is provisionally referred to the family Palaeoryctidae. Neither of these genera shows any particular resemblance to *Palaeoryctes* or *Didelphodus* and hence they are not easily assigned to either of the two North American subfamilies Palaeoryctinae or Didelphodontinae.

*Thelysia* resembles *Palaeosinopa* in having a posterior mental foramen below the posterior root of  $M_1$ , but it differs from the two species of *Palaeosinopa* of similar size, *P. lutreola* and *P. incerta*, in having shorter, higher trigonids, and narrower talonids with reduced entoconids and entocristids. *Thelysia* could conceivably prove to be a pantolestid or even a leptictid when premolars and upper molars are discovered, but present evidence favors its allocation to Palaeoryctidae.

#### ACKNOWLEDGMENTS

I thank Drs. Mary R. Dawson, Carnegie Museum of Natural History, and Donald Baird, Princeton University, for the loan of specimens described here. Thomas M. Bown, David W. Krause, and Kenneth D. Rose provided casts of Paleocene and Eocene insectivores for comparison and reviewed the manuscript. Their comments have improved it considerably. William J. Ryan is responsible for superb preparation of the holotype of *Aptoryctes ivyi*. Photography is by George Junne, and Karen Klitz drew the illustrations in Text-figures 2–4. This research was supported by a grant from the National Science Foundation (DEB 80-10846).

## LITERATURE CITED

- BOWDICH, T. E. 1821. An analysis of the natural classifications of Mammalia for the use of students and travellers. J. Smith, Paris. 115 pp.
- BOWN, T. M., and D. SCHANKLER. 1982. A review of the Proteutheria and Insectivora of the Willwood Formation (lower Eocene), Bighorn Basin, Wyoming. *Bull. U.S. Geol. Surv.*, 1523:1-79.
- BUTLER, P. M. 1972. The problem of insectivore classification. Pp. 253-265 *in*: K. A. JOYSEY and T. S. KEMP (eds.), *Studies in Vertebrate Evolution*. Oliver and Boyd, Edinburgh. 284 pp.
- CLEMENS, W. A. 1973. Fossil mammals of the type Lance Formation, Wyoming. Part III. Eutheria and summary. *Univ. Calif. Publ. Geol. Sci.*, 94:1-102.
- DORR, J. A. 1958. Early Cenozoic stratigraphy and vertebrate paleontology of the Hoback Basin, Wyoming. *Bull. Geol. Soc. Am.*, 63:59-94.
- GINGERICH, P. D. 1976. Cranial anatomy and evolution of early Tertiary Plesiadapidae (Mammalia, Primates). *Pap. Paleontol. Mus. Paleontol. Univ. Mich.*, 15:1-140.
- . 1980. History of early Cenozoic vertebrate paleontology in the Bighorn Basin. *Pap. Paleontol. Mus. Paleontol. Univ. Mich.*, 24:7-24.
- , K. D. ROSE, and D. W. KRAUSE. 1980. Early Cenozoic mammalian faunas of the Clark's Fork Basin-Polecat Bench area, northwestern Wyoming. *Pap. Paleontol. Mus. Paleontol. Univ. Mich.*, 24:51-68.
- LILLEGRAVEN, J. A. 1969. Latest Cretaceous mammals of upper part of Edmonton Formation of Alberta, Canada, and review of marsupial-placental dichotomy in mammalian evolution. *Univ. Kans. Paleontol. Contrib.*, 50:1-122.
- MATTHEW, W. D. 1913. A zalambodont insectivore from the basal Eocene. *Bull. Am. Mus. Nat. Hist.*, 32:307-314.
- McKENNA, M. C. 1975. Toward a phylogenetic classification of the Mammalia. Pp. 21-46 *in*: W. P. LUCKETT and F. S. SZALAY (eds.), *Phylogeny of the Primates*. Plenum Press, New York. 483 pp.
- NOVACEK, M. J. 1976. Insectivora and proteutheria of the later Eocene (Uintan) of San Diego County, California. *Contrib. Sci. Los Angeles Cty. Nat. Hist. Mus.*, 283:1-52.
- ROMER, A. S. 1966. *Vertebrate Paleontology*. Univ. Chicago Press, Chicago. 468 pp.
- ROSE, K. D. 1981. The Clarkforkian Land-Mammal Age and mammalian faunal composition across the Paleocene-Eocene boundary. *Pap. Paleontol. Mus. Paleontol. Univ. Mich.*, 26:1-196.
- SIMPSON, G. G. 1937. The Fort Union of the Crazy Mountain Field, Montana, and its mammalian faunas. *Bull. U. S. Natl. Mus.*, 169:1-287.
- SZALAY, F. S. 1977. Phylogenetic relationships and a classification of the eutherian Mammalia. Pp. 315-374 *in*: M. K. HECHT, P. C. GOODY, and B. M. HECHT (eds.), *Major Patterns of Vertebrate Evolution*. Plenum Press, New York. 908 pp.
- VAN VALEN, L. 1966. Deltatheridia, a new order of mammals. *Bull. Am. Mus. Nat. Hist.*, 132:1-126.
- . 1967. New Paleocene insectivores and insectivore classification. *Bull. Am. Mus. Nat. Hist.*, 135:217-284.
- WINGE, H. 1917. Udsigt over Insektaedernes indbyrdes Slaegtskab. *Vidensk. Meddel. Dansk Naturh. Foren.*, Copenhagen, 68:83-203.

