Article IX.—A REVISION OF THE LOWER EOCENE WASATCH AND WIND RIVER FAUNAS.

BY W. D. MATTHEW AND WALTER GRANGER.

PART II. ORDER CONDYLARTHRA, FAMILY HYOPSODONTIDÆ.

BY W. D. MATTHEW.

In the present revision the Condylarthra were assigned to Mr. Granger, the Insectivora, including Hyopsodontidae to Dr. Matthew. The transfer of this family to the Condylarthra was not decided upon until after the detailed studies were completed; it appeared advisable therefore to place it in a separate section from the Phenacodontidae and Meniscotheriidæ revised by Mr. Granger.

Following is the diagnosis of the order as here understood:

Order Condylarthra. Herbivorous or omnivorous placentals with complete dentition, five-toed feet, ball-and-socket ankle joint and small brain. Upper molars low-crowned, rounded trigonal or quadrate with five or six principal cusps, the para- and metaconule distinct or strong; lower molars with four principal cusps, trigonid not elevated; third lobe of m₃ short or absent. Posterior premolars simple or progressively molariform; anterior premolars, canine and incisors simple, little differentiated, usually in continuous series. Humerus with supratrochlear vacuity and entepicondylar foramen. Ulnar shaft wide and stout; a third trochanter on femur; fibula complete, wholly separate from tibia. Carpal bones moderately displaced (becoming nearly serial in Phenacodus); tarsals serial. Astragalus with distinct neck and ball-head, astragalar foramen present except in later Phenacodonts. Manus and pes mesaxonic, pollux and hallux not opposable. Phalangeal joints more or less distinctly of hinge type; unguals narrow, claw-like, or broadened into flat hoofs.

Five families are at present included, the fifth provisionally.


4. *Meniscotheriidae.* Lophoselenodont; first two upper molars quadrate, hypocones united with metaconules into a crest, remaining cusps crescentic; last upper molar triangular, no third lobe in last lower molar; premolars progressively molariform. Unguals narrow hoofs. *Lower Eocene.*

5. *Pleuraspidotheriidae.* Bunoseolenodont with two conical outer cusps and two crescentic inner cusps, conules vestigial; premolars progressively molariform. Astragalus with broad trochlea and short neck; unguals narrow hoofs. *Paleocene.* Systematic position doubtful; placed here on Schlosser's authority.

A number of South American genera, mostly from the Notostylops beds, have been referred to the Condylarthra by Ameghino and other authorities. Some of them may belong to this order, but their family reference is uncertain.

**Family HYOPSODONTIDÆ.**

The position of this family was discussed at some length by Matthew in 1909. The family was not then removed from the Insectivora, where it had been placed by Wortman and Loomis, but the discussion of its relationship concluded with the statement: "Nevertheless I believe that its affinities are in reality closer to the Condylarthra than to the more typical Insectivora."

Additional skeleton material of *Hyopsodus*, including a well preserved hind foot, serves to confirm the above somewhat tentative conclusion, and makes it advisable to remove the family to the Condylarthra. Its position in the Insectivora has always been anomalous, and could only be defended by regarding this order as a sort of catch-basket for primitive unspecialized placentals that could not be placed elsewhere. It also involved difficulties as to the position of the Miocænidæ, which while generally regarded as primitive Condylarthra appeared to be nearly allied to the Hyopsodontide.

The astragalus, while very primitive, is distinctly of the type peculiar to primitive Carnivora and Condylarthra, as opposed to the characteristic form of the Insectivora or that of the primitive Primates. The teeth exclude it from the Creodonta. In teeth, skull and skeleton characters it compares best with the most primitive among the Condylarthra, and the ungual phalanges, while they are claws rather than hoofs, are but little different in type from those of *Tetraclœnodon.* The only character somewhat difficult to reconcile with condylarthrous affinities is the short pubic symphysis.

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Haplomylus gen. nov.

Fam. ?Hyopsodontidae.
Type, Microsyops speirianus Cope, probably from the Lower Wasatch of the Bighorn basin, Wyo.

This imperfectly known species was described by Cope from a lower jaw fragment with m1-3 and provisionally referred to Hyopsodus and subsequently to Microsyops. Numerous additional specimens have been secured from the Bighorn basin, and show that it represents a distinct genus.

The lower molars consist of four cusps, somewhat obliquely set, but less so than in Hyopsodus, lower, and with a distinctly basined heel. The last molar is considerably reduced. The fourth premolar is more compressed and elongate than in Hyopsodus, with the principal cusp distinctly twinned, and a sharp narrow heel, and small anterior basal cusp.

The upper teeth are of ovate-trigonal outline, with hypocone well developed but from the posterior wing of the protocone, so that it does not project postero-internally. The external cusps are rather small, with distinct para-, meso- and metastyles; the conules are small but distinct. The fourth premolar is triangular with the principal cusp central, and three minor cusps at the internal, postero-external and antero-external angles. The last upper molar is greatly reduced and simplified.

The affinities of the genus appear to be with Hyopsodus and Mioclanus. Tarsiid relationship is improbable, judging by the compressed premolar and the general set of the molar cusps.

Haplomylus speirianus (Cope 1880).


Type, Am. Mus. No. 4190, a lower jaw fragment with three molars preserved.
Fig. 8. *Hyopsodus walcottianus*, type, No. 14654, upper and lower jaws three times natural size. Lost Cabin beds, Alkali Creek, Wind River basin, Wyoming.
The type was originally described with other fossils as from the Wind River basin, but in 1885 the locality was definitely stated as Bighorn Valley. In cataloguing the Cope Collection in 1896 I referred this discrepancy to the collector, Dr. Wortman, who informed me that although most of his collections of 1880 came from the Wind River Valley and of 1881 from the Bighorn basin, he did obtain a few specimens in 1880 from the Bighorn which were at first wrongly supposed by Professor Cope to have come from the Wind River Valley, the error being subsequently corrected. I cite these circumstances, because later collecting indicates that this genus is wholly limited to the lower part of the Wasatch, and is a valuable horizon-indicator (leitfossil). This is equally true of Didymictis leptomylus, described in the same notice as H. speirianus, as from the Wind River. It is abundant in the lower part of the Wasatch but has not been found in the Upper Gray Bull, Lysite or Lost Cabin, where it is replaced by larger and more progressive species. The type specimens of these two species have more the appearance of specimens from the Lower Wasatch of the Bighorn basin than of specimens from the Lost Cabin or Lysite beds of the Wind River Valley.

It appears reasonably certain therefore that the true horizon of the type of Haplomylus speirianus is Lower Wasatch. Of the referred specimens thirty-two are recorded from the lower Gray Bull, six from the Sand Coulée, two from the Clark Fork beds, of the Bighorn and Clark Fork basins; none from the Wind River basin. They are all parts of upper or lower jaws with more or less of the premolar and molar dentition preserved; in No. 16107 upper and lower teeth of the same individual are associated. The skull and skeleton are unknown.

Hyopsodus Leidy 1870.¹

Type, H. paulus from the Lower Bridger (Orohippus zone) of Wyoming.

Principal diagnostic characters: skull mesaticephalic, occiput broad, mastoid exposure considerable, lachrymal exposed upon face, lachrymal foramen within orbital rim, zygomatic arches deep, nasals not expanded posteriorly, palate not fenestrated nor extended backward nor crested on posterior margin; incisors unreduced, pointed, subpatulate, canines small, incisiform, premolars progressively complex, the anterior premolars, canines and incisors in both upper and lower jaw similar in size and character without diastemata, posterior premolars progressively complex in cusp constitution, submolariform; molar cusps tending to be round conical, upper molars six-cusped, conules prominent, hypocone progressively developed, no external styles, lower molars with four principal cusps partly alternating (the inner pair not opposite the outer pair), heels not basined, hypoconulids small median, heel of m3 comparatively short; humerus moderately expanded distally with entepicondylar foramen and supratrochlear vacuity, shaft of ulna wide but thin, olecranon large, radius with flattened oval head; carpals separate, lunar-unciform contact considerable; in pelvis iliac bar trihedral, ischium takes little or no part in symphysis, femur rather short, third trochanter prominent and situated well down on shaft, tibia separate from fibula; in pes, astragalus with short distinct neck, flattened head, tibial facet oblique, little grooved, no inner malleolar crest, foramen distinct, calcaneum with slight fibular facet, cuboid with distinct astragal facet facing chiefly internal, five metatarsals, the lateral digits unreduced, distal ends hinge-jointed, phalanges short, unguals claw-like, fissured, not compressed.

This genus is abundant in all the Eocene horizons above the Clark Fork. In the Clark Fork it is not found. Although skulls and skeleton parts are rare the species are represented in our Wasatch and Wind River collections by great numbers of jaws and parts of jaws, about one thousand altogether. The chief specific distinctions are: size, length of teeth, differentiation of enotoconid from hypoconulid on m3; development of hypocone on upper molars, size of m3 and of heel of m3, form of p3 = 3.4 and disappearance of the basined talonid. In these characters the oldest species approach near to Haplomylus, while the latest species approximate those of the Middle Eocene.

The true horizons of the several Lower Eocene species have not heretofore been understood correctly, but the abundant comparative material makes them clear. The described species are as follows:

<table>
<thead>
<tr>
<th>Species</th>
<th>Horizon</th>
<th>Region</th>
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<tbody>
<tr>
<td>H. miticulus</td>
<td>Cope, 1874</td>
<td>Wasatch</td>
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<tr>
<td>H. mentalis</td>
<td>Cope, 1875</td>
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<tr>
<td>H. lemoinianus</td>
<td>Cope, 1882</td>
<td>Bighorn basin</td>
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<tr>
<td>H. powellianus</td>
<td>Cope, 1885</td>
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<tr>
<td>H. wortmani</td>
<td>Osborn, 1902</td>
<td>Wind River basin</td>
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<tr>
<td>H. simplex</td>
<td>Loomis, 1905</td>
<td>Bighorn basin</td>
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<tr>
<td>H. minor</td>
<td>Loomis, 1905</td>
<td>Wind River basin</td>
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<tr>
<td>H. browni</td>
<td>Loomis, 1905</td>
<td>“</td>
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<tr>
<td>H. jacksoni</td>
<td>Loomis, 1905</td>
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</tbody>
</table>

All these are nearly allied to each other and to the Bridger species. H. lemoinianus appears to be a synonym of H. mentalis, and H. jacksoni
of *H. browni*. The others are retained as species or subspecies and two new forms are added.

Osborn in 1902 pointed out the evolutionary progress observable in the species of *Hyopsodus* from successive stages of the Lower and Middle Eocene; this is in general confirmed and extended by the far larger collections now available and the somewhat wider geologic range of the genus; but it is evident that not one but three or four phyla are present in each horizon; the relations of the Lower Eocene species to those of the Middle Eocene are not wholly clear, and the geological overlap of stages of each structural phylum suggests rather progressive displacement of older by newer stages coming in from some other region, than gradual evolution *in loco*. It might equally well be interpreted as the displacement of older by newer "mutants", in the DeVriesian sense of this term.

However this may be, the Lower Eocene species are distinguished from those of the Middle Eocene by the less molariform premolars, and this is most noticeable in *H. simplex* from the lowest horizon, while the Lost Cabin species approach nearest to those of the Bridger. In *H. simplex* the hypocones of the upper molars are smaller, the lower molar heels are more distinctly basined, m³ is small and the entoconid of m₃ is not distinct from the hypoconulid, characters lost in the later species and indicating affinities with the Paleocene Mioclenidæ, and with the more or less intermediate genus *Haplomylus*.

Ameghino has referred to the Hyopsodontidæ the genus *Selenoconus* of the Notostylops horizon in Patagonia, considering it as a separable with difficulty from *Hyopsodus*. His figures and descriptions indicate, however, that the lower molars in this genus had the characteristic and peculiar construction of the Notoungulata, which I will have occasion to discuss in a later section of this revision. Schlosser refers *Selenoconus* to the Archaeopithecidae, and figures the upper and lower teeth of *Oldfieldthomasia*, a closely related if not identical genus. Such resemblances as appear between this genus and the Hyopsodontidæ may perhaps indicate common descent from the Mioclenidæ but probably not any closer relationship.

**Key to Species of Hyopsodus.**

A. Hypocone small on m₁−₂, absent on m₃.
   a. M₃ and heel of m₃ very small, no entoconid on m₃.
      1. M₁−₃ = 10 mm. ........................................... *H. simplex*.
   b. Hypocone well developed on m₁−₂, small on m₃.

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b. $M^3$ and heel of $m_3$ small, entoconid of $m_3$ imperfectly separate from hypoconulid
2. $M_{1-3} = 11$ mm. ........................................... $H. miticulus$

c. $M^3$ and heel of $m_3$ large, entoconid of $m_3$ distinct from hypoconulid
3. $M_{1-3} = 10$ mm. ........................................... $H. wortmanii$
4. $M_{1-3} = 12$ mm. ........................................... $H. mentalis$

d. Hypocone strong on m1–3, p4 subquadrangular
5. $M_{1-3} = 18$ mm.; $p^4_3$ simpler ................................ $H. powellianus$
6. $M_{1-3} = 20$ mm.; $p^4_3$ more complex ................................ $H. walcottianus$

e. Hypocone strong on m1–2, variable on m3, p4 subquadrate
Premolars more crowded, p4 quadrangular, roots of p4 connate or completely united. All from Middle Eocene.
7. $M_{1-3} = 13$ mm. ........................................... $H. paulus$
8. $M_{1-3} = 11$ mm. ........................................... $H. minusculus$
9. $M_{1-3} = 12$ mm. ........................................... $H. lepidus$
10. $M_{1-3} = 14$ mm. ........................................... $H. despiciens$
11. $M_{1-3} = 15$ mm.; deuterocone on p4 ................................ $H. marshalli$

**Hyopsodus simplex** Loomis 1905.


*Type,* a lower jaw fragment in the Amherst Museum.

This species is characteristic of the red-banded basal zone (Sand Coulee beds) of the Wasatch, although the type is from the later Gray Bull horizon and does not display the primitive characters so clearly as the older specimens.

$M^3$ and the heel of $m_3$ are much reduced, hypocone weak on m1–2, absent

Fig. 3. *Hyopsodus simplex* Loomis, No. 16842, upper and lower jaw fragments. Sand Coulee beds, Clark Fork basin, Wyoming. Upper molars, lower molars and p4, crown and external views, three times natural size.
on m₃, deuterocone of p⁴ more triangular than in H. miticulus with weaker cingula on its anterior and posterior faces.

Referred specimens in Amer. Mus. Coll., Nos. 16081, anterior half of skull, 16082–7 upper and lower jaw fragments. All from Sand Coulée beds of Clark Fork basin. Length, m₁-₃ = 10–11 mm.

This species shows a marked approach to Haplomylus, and through that genus to the Mioclenidæ and the smaller Periptychidæ.

**Hyopsodus miticulus** (Cope 1874).


*Type*, a lower jaw fragment with m₁-₃, fig. 10 of Cope’s 1877 report. Not found in National Museum collection.

The species is distinguished by small size, short wide molars, short and small fourth premolar. Hypocone strong on m₁-₂ but smaller than protocone; a small hypocone on m₃. M₃ smaller than m₁. Metacone usually small. Deuterocones of p₃-₄ relatively small. En-\-toconid imperfectly separated from hypoconulid. Length of m₁-₃ = 10.5 to 12 mm.

No. 16199, upper and lower jaws from the Almagre horizon of New Mexican Wasatch, agrees with Cope’s figure and description and may serve as toptype. No additional specimens from this region, but it is very abundant in the Gray
Bull horizon of the Bighorn Wasatch. Several hundred specimens are at hand for comparison showing a considerable range in size, and variation in various characters, but fairly constant in those cited above.

**Hyopsodus mentalis** Cope 1875.


_Type_, a lower jaw fragment with _m_1–2, figured by Cope in 1877. Not found in National Museum collection.

No. 16194, upper and lower jaws, from the upper horizon (Largo beds)

![Diagram of Hyopsodus mentalis](image)

_Fig. 5. Hyopsodus mentalis_ Cope, topotype, upper and lower jaws, No. 16194. Crown views of upper and lower teeth and external view of lower jaw fragment all enlarged to three diameters. _Largo beds, Ojo San Jose, Wasatch of New Mexico._
of the New Mexican Wasatch, agrees with Cope’s figure and description and may serve as toptype.

The species is larger than *H. miticulus*, the lower molars more elongate, the fourth premolar decidedly larger, longer and more trenchant. The hypoconulid and entoconid of *m*₂ are clearly distinct. *M*³ almost or quite as large as *m*¹, hypocone distinct, and on *m*¹⁻² subequal with protocone. Deuterocone of *p*¹ as wide as protocone, on *p*³ large with strong connecting crests. Length of lower molars, *m*₁⁻₃ = 14–15 mm.

A number of jaws from the upper and lower levels of the New Mexican Wasatch agrees very nearly with this species. There would appear to be considerable variation in certain characters. In three specimens the last upper molar has the metacone greatly reduced, in the others, as in the toptype, it is normal. In the toptype, as in Cope’s type, the metaconid is indistinctly twinned, but in other specimens it is simple.

*Hyopsodus lemoinianus* Cope does not differ in any way from this species. The type is from the Bighorn Wasatch, horizon unknown. Loomis records the species as from the Gray Bull River, but all our typical material comes from the Lost Cabin horizon, and some if not all of his Gray Bull specimens may be from this level, others are perhaps large individuals of *miticulus*.

In the Lost Cabin horizon this species is abundant both in the Bighorn basin and in the Wind River Valley. It is represented by the smaller mutant *lysitensis* in the Lysite of both basins.

*Hyopsodus mentalis lysitensis* subsp. nov.


*Type*, No. 15621, left ramus of jaw with *p*₂–*m*₃; Lysite beds, 15 Mile Creek, Bighorn basin, Wyo. Exp. 1911.

While the typical *mentalis* appears to be strictly limited to the Lost Cabin zone, a smaller form is abundant in the Lysite both in the Wind River and Bighorn basins. I regard it as a subspecies of *mentalis*.

This subspecies lies intermediate between *H. mentalis* and *H. miticulus*, both in size and progressiveness. Although chiefly found in the Lysite, it occurs more sparingly in the Lost Cabin horizon.

*Hyopsodus powellianus* Cope 1885.


Phenacodus laticuneus Cope, 1882, in part, see infra, p.?

Type (lectotype), No. 4147, lower jaw with m1–3. Horizon unrecorded, Bighorn basin, Wyoming.

Characters: M1–3 = 18 mm. M3 with long heel, entoconid distinct. Hypocones of m1–3 strong, antero-internal cingula heavy, p4 subquadrate. P4 with well developed deutoconid.

This species is very abundant in the Lysite horizon, in the Bighorn basin. So far as our material shows it is wholly confined to this level, although Loomis records two specimens from the Gray Bull (but possibly these are

Fig. 6. Hyopsodus powellianus Cope, topotype, upper jaw, No. 15622. Crown view of upper teeth, left side enlarged three diameters. The premolars are reversed from the right maxilla. Lysite beds, Coyote Cañon, Bighorn basin, Wyoming.

Fig. 7. Hyopsodus powellianus, topotype, No. 15614, lower jaw, three diameters. Lysite beds, Fifteen-mile Creek, Bighorn basin, Wyoming.
also from the Lysite). It has not been found in New Mexico. In the Wind River basin it is represented in the Lysite horizon by a nearly related but uniformly smaller variant *H. browni*.

**Hyopsodus powellianus browni** **Loomis.**


*Type*, a lower jaw fragment in the Amherst Museum.

The fourth premolar of Dr. Loomis's type is altogether exceptional in the lack of any strong deuteroconid. This is not the normal character of the species as shown by a large series of topotypes in the American Museum collection. The supposed third premolar of *H. jacksoni* ("lawsoni" in figure) appears to be the fourth premolar of a smaller individual. While the topotype series shows some variability in the form of m³ and a few other characters they run fairly constant in size and in most characteristics and there is no indication of the peculiar features on which Dr. Loomis characterized these two species, and which are not normally present in any species of this genus, although they occur occasionally as abnormalities. I regard the series as representing a single subspecies intermediate in size between *H. powellianus* and *mentalis* and somewhat more primitive than either. The heel of the last molar is more elongate than in *H. mentalis*, the heel of p₃ has no inner cusp, and the size is larger. These characters ally it with *powellianus*. It is abundant in the type locality, Cottonwood Draw (Bridger Creek) in the Wind River basin, and found more rarely in the Lysite of the Bighorn basin. A few doubtful specimens are found in the Lost Cabin horizon.

**Hyopsodus walcottianus** **sp. nov.**

*Type*, No. 14654, upper and lower jaws, parts of limb bones and hind foot, from Lost Cabin beds, Wind River basin.

*Distinctive Characters.* Larger than *H. powellianus*, deuterocones of p³-⁴ more conical with no anterior crescent-wing, deuteroconid of p₄ more posterior in position, p₃ more robust, less spatulate, basal cusps of lower premolars and external styles of upper premolars more distinct. Length m₁-³ = 18; m₁-₃ = 21 mm.

This is the largest known species of the genus, and appears to be the Lost Cabin successor of *H. powellianus* of the Lysite beds. It has therefore seemed appropriate to name it after the distinguished paleontologist who was Major Powell's successor as director of the Geological Survey.

In addition to the type, two lower jaws are referred here, one from the
Lost Cabin horizon, at Beaver Creek divide, south of the Wind River basin, No. 14967, the other from the typical Lost Cabin beds, No. 14617. The latter is smaller but otherwise shows the progressive character of the species. Other fragmentary specimens are of doubtful reference.

The characters of limb and foot bones have been indicated in the generic diagnosis of *Hyopsodus*. Except in size and robustness I do not observe any specific distinctions in the skeleton parts from *H. paulus* as described in the Bridger memoir.

**Hyopsodus wortmani** Osborn 1902.


Type, No. 4716, upper and lower jaws from the Wind River basin, Wyoming.

The lower molars are narrow and elongate, the heel of m₃ long, with entoconid well separated from metaconulid, and the last upper molar is larger than in *H. miticulus*, the size of its hypocone varying but more frequently large. The premolars are distinctly more progressive, p₄ more quadrate in outline, with deuteroconid and deuterocone relatively larger than in the older species. From *H. mentalis* it is distinguished by smaller size and less robust form of teeth.

This form is common in the Lost Cabin horizon of the Wind River basin, while in the Lysite a smaller form, probably a subspecies, is found, and has been named *H. minor* by Dr. Loomis.

This species and *H. mentalis* are closely related to the Bridger species, *H. minusculus* and *H. paulus* respectively. The distinctions are not clear, although the Middle Eocene species average more progressive.

**Hyopsodus wortmani ?minor** Loomis 1905.

A lower jaw from the Lysite level in the Wind River Valley and another from the same horizon in the Bighorn basin indicate a little *Hyopsodus* close to *H. wortmani* in tooth characters, but of smaller size, the molars only 10 mm. In its relatively narrow, high cusped teeth, long heel of m₃ and well separated metaconid it is very different from *simplex* with which it agrees in size.

Loomis’s type of *Hyopsodus minor* came from the same locality and level as these Wind River specimens and agrees in size; but Loomis describes the teeth as “short,” whereas in these specimens, as in *wortmani*, they are unusually long. The identification is therefore questionable.
Figs. 9 and 10. *Hyopsodus walcottianus*, type, hind foot, humerus, tibia and astragalus, all one and a half times natural size. No. 14654, Lost Cabin beds, Wind River basin, Wyoming.
**Geological Level and Localities of Species of Hyopsodus.**

On account of their great abundance the species of *Hyopsodus* afford valuable data for correlation of the Lower Eocene formations.

Their occurrence in our collections so far as identifiable is as follows:

I. Clark Fork basin.
   C. Gray Bull beds (Systemodon zone)
      *H. miticulus* 24 specimens
   B. Sand Coulée beds
      *H. simplex* 18
   A. Clark Fork beds
      No *Hyopsodus*

II. Bighorn basin.
   C. Lost Cabin
      *H. valcottianus* 2
      *H. powellianus browni* 1
      *H. mentalis lystensis* 3
      *H. wortmani* 2
   B. Lysite
      *H. powellianus* 114
      *H. powellianus browni* 2
      *H. mentalis lystensis* 96
      *H. wortmani minor* 2
   A. Gray Bull beds.
      *H. miticulus* about 450

III. Wind River basin.
   B. Lost Cabin
      *H. valcottianus* 3
      *H. mentalis* 50
      *H. * " lystensis* 17
      *H. wortmani* 14
   A. Lysite
      *H. powellianus* 4
      *H. " browni* 92
      *H. mentalis* 1
      *H. mentalis lystensis* 32
      *H. wortmani minor* 1

IV. New Mexican Wasatch.
   B. Upper zone (Largo beds)
      *H. mentalis* 27
   A. Lower zone (Almagre beds)
      *H. mentalis* 15
      *H. " lystensis* 120
      *H. miticulus* 1

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1 Mostly from top of lower beds.
The Status of the genus Diacodexis Cope 1882.\(^1\)

(Type *Phenacodus laticuneus* Cope 1882.\(^2\)) The type species of this genus was based upon a specimen, No. 4202, Am. Mus. Coll., consisting of three jaw fragments with teeth supposed to belong to one individual. It now appears that these three fragments pertained to animals of three different orders of mammalia, as follows:

(a) Upper premolars of *Eohippus* sp.
(b) Upper molars of *Hyopsodus* sp.
(c) Last lower molar of an Artiodactyl related to *Trigonolestes*.

When the Cope collection was acquired by the American Museum this type was reexamined by Professor Osborn and Dr. Wortman, and recognized as a composite of *Eohippus* and *Hyopsodus*. As a result of this examination in 1899 the upper premolars were removed from the type by Matthew \(^3\) and the species referred to *Hyopsodus*. The characters of the upper molars were the substantive basis of this reference, the lower molar being recognized as abnormal for *Hyopsodus* although its true character was not suspected. The new collections from the Wasatch beds of the

\(^1\) Amer. Nat., Vol. XVI, p. 1029.
Bighorn Valley include remains of a number of genera and species of Trigonolestidae, comparison of which with the lower molar of *Diacodexis* enabled Mr. Granger to recognize its real relationship.

The upper molars are unquestionably *Hyopsodus* and agree with specimens referred to *H. powellianus* Cope 1885. (*P. zuniensis* Cope,\(^1\) 1882, *l. c.*)

Of the three specimens, No. 4202, a., b. and c. which constitute co-types of *Diacodexis laticuneus*, the jaw fragment with m\(_3\) must apparently be taken as lectotype. It is the first described specimen, as its characters form the basis of the specific distinctions given in the key to the species of *Phenacodus* on p. 12 and a reference to this characterization precedes the description of the upper molars in the species description on p. 19. It is the specimen upon which the species name is obviously based. And it is a corresponding part to the type specimen of *P. primæus* which Cope had described in 1873, on the evidence of a last lower molar. The m\(_3\) of "*Phenacodus*" *laticuneus* agrees sufficiently with the type m\(_3\) of *P. primæus* to suggest its belonging to the same genus; this suggestion was evidently confirmed in Professor Cope's mind by comparison of the upper molars, No. 4202b, with those of other species of *Phenacodus*, *P. primæus* and *P.* (now *Tetraclinodon*) *puercensis*.

The lower jaw fragment therefore was the primary basis of the specific distinctions and in part the basis of the generic reference of the original description of *P. laticuneus*, and is the first of the cotype specimens to be described. Following the intent of the author so far as ascertainable\(^2\) it should therefore be selected as the lectotype.

*Diacodexis* thus stands as a genus of Eocene Artiodactyla, not as a synonym of *Hyopsodus*, and the name has been so used by Dr. Sinclair,\(^3\) preoccupying *Trigonolestes* of later date.

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\(^1\) This is not *P. zuniensis* Cope 1881 (Proc. Am. Phil. Soc., XIX, 492), which was referred by Matthew in 1897 to *Tricentes subtrigonus*.
