PALEONTOLOGY.—*A new species of mylagaulid from the Chalk Cliffs local fauna, Montana.* Malcolm C. McKenna, University of California. (Communicated by C. Lewis Gazin.)

In the course of field work in 1950 Dwight W. Taylor and the writer collected fossil vertebrate material briefly at exposures in the sediments interbedded in the volcanics along the banks of the Yellowstone River, 23.6 miles north of Gardiner, Mont. Collections from this locality have been designated the Chalk Cliffs local fauna by Wood et al. (1941). The specimens obtained in 1950 were a right scaphoid of a camelid about the size of a llama, a P³ or P⁴ of *Parahippus* cf. *P. brevidens*, merychippine cheek tooth fragments (not retained), several tortoise limb bone fragments, and the incomplete mylagaulid skull herein described. These specimens suggest a probable early Barstovian age for the Chalk Cliffs local fauna. I am indebted to Seth B. Benson for his advice on dental succession and to R. A. Stirton, D. E. Savage, and R. H. Tedford for their criticism of the manuscript. The drawings are by Owen J. Poe.

**Mylagaulus douglassi**, n. sp.

*Type.*—U. C. 44694, named in honor of Earl Douglass.

*Type locality.*—U. C. M. P. Loc. V-5060, exposures next to the highway on the east side of the Yellowstone River, 23.6 miles north of Gardiner, Mont.

*Distribution.*—Type locality only.

*Age.*—Early Barstovian or possibly latest Hemingfordian.

*Diagnosis.*—Very large mylagaulid (Fig. 1.) with posteriorly closely approximated temporal crests; hornless, essentially flat, unelevated nasals; skull flat from nasals to occipitals, not anteroposteriorly compressed; teeth small in comparison to skull size; $P^3$ absent; $M^2$ and $M^3$ bearing five fossettes each; $P^4$ oval, with divided anterofossette at early stage of wear, parafossette round and tiny, metafossette double, slight angulation in mesostylar region; cement absent from sides of teeth; capsule of $P^4$ forming shelf at rear of infraorbital foramen; sphenopalatine foramen a large, anteroventrally trending slit, well separated from orbital fissure; nasolacrimal and accompanying foramen large, at rear of infraorbital foramen; nutrient foramina anterior to sphenopalatine multiple, not single; optic foramen small; anterior ethmoid foramen small.

*Discussion.*—*Mylagaulus douglassi* is a very large mylagaulid, equaled in size by the Pliocene *Epigaulus hatcheri* alone among members of the family. The skull herein described is approximately thirty percent larger than the skull of a described but unnamed Pliocene mylagaulid from Big Spring Canyon, S. Dak. (J. T. Gregory, 1942), and a minimum of fifty percent larger than all other described skulls of *Mesogaulus* or *Mylagaulus*. Pliocene mylagaulids became larger than those of the Miocene as a rule, but, what is more important, fourth premolar size increased at an appreciably greater rate than skull size. For this reason it would be premature to state that various large premolars from Hemphillian localities represent animals with larger skulls than that of *Mylagaulus douglassi*, even though the teeth of *M. douglassi* are smaller. Another prominent feature of *M. douglassi* is that dorsally the skull does not show the extreme anteroposterior compression shown by late Barstovian and later forms. In general aspect, the skull is reminiscent of the skulls of *Promylagaulus*, *Mylagaulodon*, and *Aplodontia*, rather than of the late Barstovian and Pliocene mylagaulids. Horns were apparently absent, though a slight elevation is possibly indicated by the broken anterior edges of the nasals.

In dental pattern comparisons must be made with great care in view of the variation shown by various stages of wear, but it can be stated cautiously that *M. douglassi* compares most favorably with *Mesogaulus vetus*, *Mylagaulus laevis*, and the Mascall mylagaulid, especially with the Mascall form and the type and numerous referred specimens of *M. laevis*. The parafossette of $P^4$ differs from that in the type of *M. laevis* and from that of the apparently more advanced referred specimens of *M. laevis* from Skull Spring and Beatty Buttes, Oregon, in that this fossette is small and round, as in the referred specimens of *M. laevis* from the lower Snake Creek and in *Mesogaulus vetus*. Specimens numbered 14310 in the Peabody Museum, Yale University, from the Mascall formation at

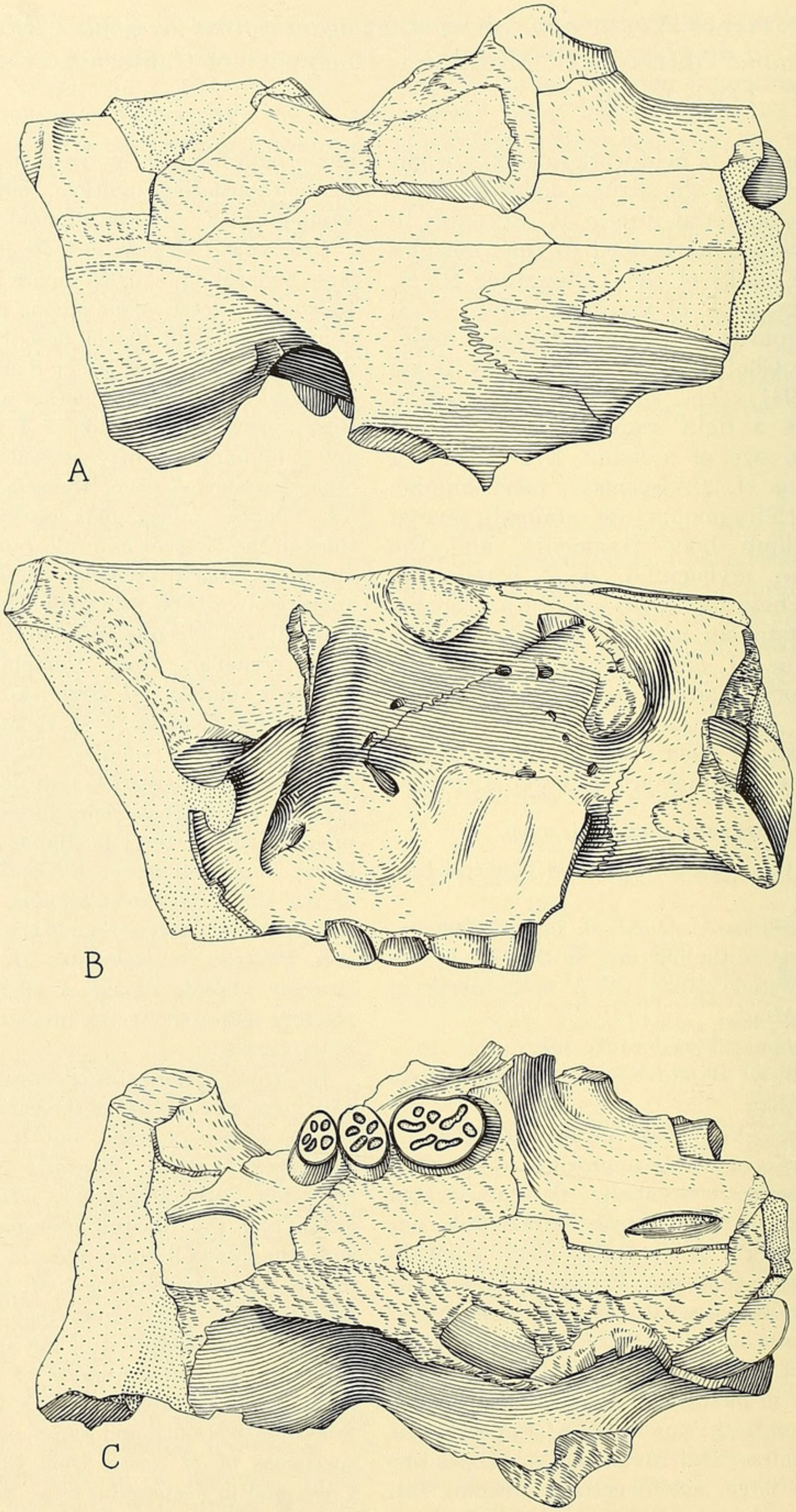

Fig. 1.—*Mylagaulus douglassi*, n. sp.: Dorsal (A), lateral (B), and occlusal (C) views of fragmentary skull, U. C. 44694. × 1½

Paulina Creek in the Crooked River region of Oregon show a pattern almost identical with that of the $P^4$ of *M. douglassi* and the lower Snake Creek referred specimens of *M. laevis*, but they average twenty percent smaller than *M. douglassi* teeth. Perhaps it would be useful to speak of the *Mylagaulus laevis* group, in analogy to the *Aelurodon saevus* group. The members of the *M. laevis* group would be *M. laevis*, the referred specimens of this species from various localities, the Mascall form, and *Mylagaulus douglassi*. The parafossette of these forms differs radically from that of *Mesogaulus pristinus* or of any of the Pliocene mylagaulids, in which the parafossette is elongate or multiple.

The placement of *M. douglassi* in Mylagaulus instead of in *Mesogaulus* is somewhat arbitrary in view of the fact that it is not known whether there was a parafossettid. But as *M. douglassi* belongs to the *Mylagaulus laevis* group on the basis of other characters, it seems probable that there was a small parafossettid as in the other members of the group. Direct comparison of *M. douglassi* with *Mesogaulus ballensis* from the nearby Deep River beds is impossible at present, but a considerable size discrepancy exists between the two forms.

Dorr (1952) has recently proposed that the adult mylagaulid cheek dentition becomes $P^4_4$, $M^1_1$,$M^2_2$. Matthew (1924) stated that the adult cheek dentition becomes $P^4_4$,$M^2_2$,$M^3_3$. Matthew's formula is followed in the present paper for the following reasons, though the question cannot yet be regarded as completely settled. First of all, a simple, permanent $P^3$ is present in *Promylagaulus riggsi*, *Mylagaulodon* cf. *M. angulatus*, *Mesogaulus paniensis*, *Mesogaulus vetus*, possibly *Mesogaulus praecursor*, and *Aplodontia*. This tooth is pushed out by the emerging $P^4$ in the advanced mylagaulids. That it is a permanent $P^3$ is attested by analogy with *Aplodontia*, in which a deciduous, peg-like $P^3$ may be observed in young animals. Deciduous and permanent $P^3$ thus accounted for, the two teeth replaced next must be $dP^4$ and $M^1$. In the skull of *Mylagaulus* from Big Spring Canyon it is possible that a second molar was pushed out by $P^4$ in old age, though it still could be that the rear molars have been lost. I know of no specimens, however, that show marked reduction in the last molar of the series, a condition which might be expected to precede loss of such a tooth in most instances.

Dorr states (1952, pp. 322) with regard to the lower dentition that "it is difficult to suppose that as $M_1$ (instead of $dP_4$) it would remain brachyodont in the midst of a strongly hypsodont dentition". However, it would seem reasonable that since $dP^4_4$ and $M^1_1$ erupt at about the same time, that they could look more similar than Dorr suggests, i.e., that both could be brachydont, particularly in view of the depth of jaw available for teeth in such a young animal. An example of what is meant here is provided by the artiodactyl *Phacochoerus*, in which $M^1_1$ are pushed out of the series by the remaining molars and $P^4_4$.

Secondly, the two rooted condition of $M_1$ and narrow, single rooted condition of $M^1$ easily could be a simple adaptation to the enlarging $P^4_4$. This would be in response to crowding by $P^4_4$ and would mimic the process whereby deciduous teeth are replaced, a process whose genetic control is undoubtedly very deep-seated and influenced by modifiers such as genes for resorption.

Thirdly, at least in $M^1$, a specimen of *Mylagaulus* from the type Mascall formation, U. C. 39292, shows that the dental pattern of this tooth is closely similar to that of $M^2$ and $M^3$. In addition to this, the $dP^4$ and $M^1$ of *Mesogaulus vetus* differ markedly in outline, as do the same teeth in an undescribed specimen of a mylagaulid from the Burge fauna in the University of California collections.

Fourthly, Dorr's objection to the eruption of $M_1$ as part of the "premolar series" seems unfounded. This is the normal situation in rodents as well as in many other groups.

These considerations strongly suggest that Matthew was correct in giving the adult mylagaulid cheek tooth formula as $P^4_4$,$M^2_2$,$M^3_3$ for advanced forms. Arguments based on induction and analogy cannot provide certainty, but probability seems to lie on the side of Matthew's formula rather than Dorr's. In addition, arguments for the Matthew formula are somewhat simpler than those in favor of Dorr's formula, a situation which is advantageous on empirical grounds.

Wood et al. (1941) list the following members of the Chalk Cliffs local fauna:

*Merychippus* cf. *M. isonesus* [*M. seversus*]
*Mylagaulus* sp.
"?*Cosoryx*" sp. [?*Merycodus* sp.]
Proboscidea

A camelid, tortoise, and *Parahippus* cf. *P.*

*brevidens* (Fig. 2.) may now be added to the faunal list. The closest relationships of the Chalk Cliffs local fauna would seem to lie with the Mascall fauna, indicating an early Barstovian age, but latest Hemingfordian age is not impossible. The stage of evolution of *Mylagaulus douglassi* is as might be expected in either a late Hemingfordian or early Barstovian mylagaulid, with a small weight of probability in favor of the latter age. Thus far, *Parahippus brevidens* has been known only from the early Barstovian Mascall fauna.

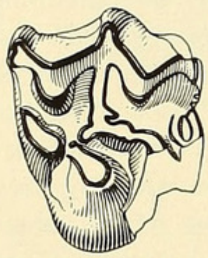

FIG. 2.—*Parahippus* cf. *P. brevidens*: Occlusal view of $P^3$ or $P^4$. × 1.

*Measurements* (in millimeters).— As follows:

| | |
|---|---|
| Length, $P^4$–$M^3$, inclusive | 17.4 |
| Length, $P^4$ | 8.8 |
| Length, diastema from incisor to $P^4$ | 24.4 |
| Length, at midline, occiput to nasofrontal contact | 43.6 |
| Width, $P^4$ | 6.8 |
| Height, maxilla at $P^4$ to nasofrontal contact | 31.1 |

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## BOTANY.—*Studies in the Begoniaceae, IV.*[1] LYMAN B. SMITH, U. S. National Museum, and BERNICE G. SCHUBERT, U. S. Department of Agriculture.

This number of our series is an addendum to floristic treatments of the family for Peru,[2] Argentina,[3] and Colombia,[4] and a preface to further floristic papers.

VENEZUELA

**Begonia steyermarkii** Smith & Schubert, sp. nov. FIGS. 1, *a–h*

Herba annua fugitiva; foliis oblique rhombicis, apicem versus serratis; inflorescentiis bifloris; bracteis persistentibus, laceratis; tepalis masculinis 2, integris; filamentis in columnam connatis, antheris elongatis; bracteolis femineis 2, persistentibus, accrescentibus, una bilobata; tepalis femineis 4, basi connatis; placentis simplicibus, stylis 3, bifidis, stigmatibus spiraliter cinctis; alis capsulae inaequalibus.

Herbaceous annual 6–10 cm high; stem simple, hirtellous, ascending; leaves asymmetric, obliquely rhombic, acute at apex and more or less so at base, subpalmately veined, rather coarsely serrate on the upper margins and ciliate on the lower, up to 15 mm long and 8 mm wide, with erect multicellular scattered trichomes above, essentially glabrous below, petioles 1–3 mm long with a few scattered spreading trichomes, stipules persistent, lanceolate, acuminate, ciliate, 4–5 mm long, 1–1.5 mm wide; peduncles axillary 8–10 mm long, sparsely hirtellous; inflorescences 2-flowered, bracts persistent, lanceolate, lacerate, 1.5–2 mm long; staminate pedicels slender 2.5–3 mm long; staminate tepals 2, subelliptic, 5 mm long, 3.5 mm wide; stamens about 15, filaments connate in a column, anthers elongate, the connective slightly

[1] The previous number in this series was this JOURNAL **40**(8): 241–245. 1950.

[2] *Begoniaceae*. In Macbride, Flora of Peru. Field Mus. Nat. Hist. Bot. **13**[4]**:** no. 1: 181–202. 1941.

[3] *Revisión de las especies Argentinas del género* Begonia. Darwiniana **5:** 78–117, *figs. 1–18*. 1941.

[4] *The Begoniaceae of Colombia*. Caldasia **4:** 3–38, 77–107, 179–209, *pls. 1–18*. 1946.