

POS
6088

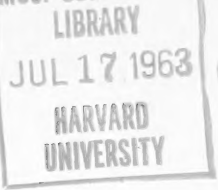
HARVARD UNIVERSITY



LIBRARY

OF THE

Museum of Comparative Zoology



Postilla

YALE PEABODY MUSEUM OF NATURAL HISTORY

Number 75

May 27, 1963

New Haven, Conn.

DAVID BALDWIN, O. C. MARSH AND THE DISCOVERY OF THE FIRST CONTINENTAL PALEOCENE FAUNAS OF THE NEW WORLD

ELWYN L. SIMONS

Recent reorganization of the collection of fossil vertebrates at the Yale Peabody Museum has brought to light material for establishing a hitherto unreported chapter in the history of western paleontological exploration—the time, place and circumstances of discovery of the first known land mammals of the New World Paleocene.¹

David Baldwin, who was to make this outstanding discovery while in the employ of Professor O. C. Marsh of the Yale College Museum [Yale Peabody Museum], was first recommended to Marsh in 1876 by Lieutenant W. L. Carpenter. In the previous year both Carpenter and Baldwin, who held a position as packer, had taken part in paleontological activities of the Wheeler Survey of New Mexico on which expedition Professor E. D. Cope of Philadelphia was also present. According to Schuchert and LeVene (1940:179), Baldwin “began to collect for Marsh in New Mexico in May, 1876, and continued intermittently until 1880. Marsh was then concentrating on Eocene

¹ Research reorganization of these collections was supported by National Science Foundation grants 14255 (1960) and GB-247 (1962).

mammals and the material of that age sent in by Baldwin—34 boxes and 20 packages—did not please him; moreover, with his customary absorption in the work at hand he failed to appreciate the value of the bones (14 boxes) collected by Baldwin from red beds, supposed to be Triassic age but later determined to be Permian. The terms under which Baldwin was to work were evidently not clearly defined by Marsh at the start, and a long wrangle resulted. The two finally agreed to submit their differences to Lieutenant Carpenter.”

Eventually Carpenter arranged a settlement which was satisfactory to both, but Baldwin clearly had been irritated by the erratic nature in which he received payment from Marsh in support of his field activities and in 1880 shifted his employment and allegiance to Professor E. D. Cope. Baldwin then sent his collections made in the region in 1880-1881 to Philadelphia which formed the basis of the first report of the Paleocene (Lower Eocene) faunas of New Mexico, published by Cope 1881a and b). Between 1880 and 1888 Baldwin collected for Cope, and his work resulted in the Cope Collection of Paleocene mammals now located at the American Museum of Natural History, New York. Serving as it did as the basis for Cope's fundamental and extensive contributions on the nature and initial differentiation of Cenozoic Mammalia, this remains one of the most important collections of fossil Mammalia ever assembled, and it stands as a fitting memorial to Baldwin's diligence in the field.

While still working for Marsh, from July 1879 through the remainder of that summer, Baldwin began to find and send in to Marsh teeth of middle Paleocene mammals from the area which he had previously mapped and recovered mammalian bone fragments. His correspondence with O. C. Marsh, now preserved at the Peabody Museum as part of the extensive archive of Marsh's correspondence, makes it possible to learn much about his activities in opening up this great fossil field.

Although its importance was not recognized at that time, this discovery came as the culmination of three years' paleontological exploration of the San Juan and Gallinas River drainages by Baldwin. During 1876, 1877 and 1878 Baldwin

was collecting almost continuously for Marsh, working particularly in Wasatch Eocene deposits of the Almagre and Largo formations in the drainage of Gallinas River, New Mexico. From these beds he sent in to New Haven a considerable collection of early Eocene Mammalia including much *Coryphodon* material. Nevertheless many of the specimens were fragmentary and incomplete and Marsh apparently was not particularly impressed by their quality. Very little was done with these shipments, many of which have only recently been sorted and identified.

An innovation relating to the history of recovery of fossil vertebrates was Baldwin's adoption in 1876 of the method of enclosing fragile fossil specimens in a clay paste prepared on the site of collection. A specimen of *Coryphodon molestus*, YPM 15239,² collected by Baldwin on Nov. 29/30, 1877 shows a further elaboration in that the clay-coated jaw was tied up between two cradle-like, hollowed and hand-carved boards (prepared by him) which effectively bandaged it for shipment. A note with the specimen by Baldwin states "N.B. Lower jaw done up in mud and boards in bottom of sack be careful very rotten." As far as can be determined from the Yale Peabody Museum records this is the first fossil vertebrate to have been housed for shipment in a manner foreshadowing modern methods. A letter from another of Marsh's collectors dated in the same year (1877) suggested that a coating of plaster of Paris would be useful in holding bones together during removal from a hard matrix in the field (see Schuchert and LeVene, 1940: 175). With these two suggestions in mind it only remained for Marsh to instruct his collectors to bandage fossil specimens in plaster jackets in the field—an invention for which he took (and is often given) credit (Schuchert, 1939:15).

By the spring of 1879 Baldwin had prepared a map of the rock types and river drainages of the San Juan Basin, New Mexico (Figure 1) and had begun collecting in horizons, which he regarded as Cretaceous, underlying the "*Coryphodon* beds." Actually these deposits were of Paleocene age but this could

² Abbreviations used in this paper: YPM, Yale Peabody Museum, New Haven; AMNH, American Museum of Natural History, New York.

hardly have been realized at that time by either Marsh or Baldwin, inasmuch as continental deposits and faunas of this epoch were then entirely unknown in North America. During this period of his explorations David Baldwin shipped materials to Yale both from Animas City, Colorado and from Abiquiu a small town on the Rio Chama about twenty-five miles due north of Los Alamos, New Mexico. In June, 1879 Baldwin sent the following geological observations to his employer in New Haven.

Animas City Colorado

June 16th, 1879

"Prof. O. C. Marsh

Dear Sir:

Inclosed send you a list of the bones I send you by mail today. They are mostly weathered specimens. The mammals entirely so. In April I sent you the horizons of this basin cut in paper [figure 1]. The beds in which I have found these mammalian remains extend no farther west than about half way between the Animas and La Plata rivers and their northern limit is about ten miles South of this place. They show themselves about twenty miles down the Rio Puerco from the head on the west side of Nacimiento Mountain and from that point westward form a nearly continuous wall of bluffs nearly to the Eastern line of the Navajo Reservation. They do not extend to the road from Santa Fe to Fort Wingate. That road for the first forty miles west of the Puerco Crossing is on the Marine Cretaceous in part though mainly upon the Lignite and the Strata containing the reptilian remains on the San Juan river. These mammalian beds do not extend as far west as the Eastern line of the Navajo Reservation on the south side of the San Juan river but they extend far beyond what I have (untill this winter) considered as the limit of the Eocene basin. On the Gallina creek side to my mind everything is in confusion. I cannot believe that I have ever sent you a fossil from those beds from there. In your address at Nashville you spoke of the *Coryphodon* beds as being the oldest known Eocene and it was that statement that showed me that I had probably

the best field in the world in which to look for Cretaceous Mammals it being a point where the oldest Eocene rested upon the newest fresh water Cretaceous. But I do not know but what you have had some other one sending you fossils from the New Mexican Eocene and probably these beds have been known to you for three or four years past.

Please tell me if I have ever sent you anything from the *Coryphodon* beds before. Are these last fossils from the *Coryphodon* beds?

I have not found any small reptiles above the coal yet though fragments of large bones are abundant. Please write to me at this place. I will work on these mammalian beds two or three weeks or perhaps a month before going back to Abiquiu.

Very truly yours,

D. Baldwin"

During the following month Baldwin continued to collect along the San Juan river and its tributaries the Animas and Canon Largo in the new extension of the "Eocene basin" which he had found, still supposing that these exposures were of Cretaceous age. Marsh's replies to Baldwin's letters during this period are not preserved, but it seems likely from the questions asked by Baldwin in the above letter of June 16, 1879 that he had not troubled to provide his collector with much information as to the nature of the fauna he was securing.

After searching in the New Mexican Paleocene for several months Baldwin at last succeeded in recovering mammal teeth which he sent to Marsh. In his letter of July 12 he discussed the occurrence of other fossils in these beds; his washing of sediments in an attempt to recover mammalian teeth may be the first time this technique, now widely applied, was used in America.

Animas City Colorado

July 12, 1879

"Prof. O. C. Marsh:

Enclosed you will find list of fossils sent to-day by mail.

I have found fragments of large Reptillian bones in the lower whitish beds resting upon the Reptilian Strata above the lignite and within 150 ft. perpendicular of the hard sandstone capping these lower whitish beds (See cut paper horizons sent you April 22nd, 79). This fact I suppose brings the Cretaceous to the hard sandstones capping the lower whitish beds.

A man living on the San Juan River has shown me where he picked up two years ago a piece of a small jaw having grinding teeth. He says it looked like the jaw of a man or monkey but says the teeth were smaller than A & B which I sent you today. The place where he found it was in the Reptillian horizon below the lower whitish beds the same horizon as the bones send in Box 2 1879 [YPM accession no. 1297] and about 400 yds. distant. I have packed dirt from the place where he said he found it 3 or 4 miles to the San Juan river and panned it out carefully to see if I could find a speck of a tooth or any fragment of small bone but could find nothing. It was a Cretaceous mammal but he has lost it. I have hunted for days and days in that vicinity and have found large reptiles in abundance but no small ones and no mammals.

I shall work my way from here down the Animas and up Cañon Largo to Abiquiu where I will try the Red rocks for a while.

Please write to me at Abiquiu and also please send me a check for \$200 as I shall greatly need it.

Very truly yours,

With the exception of the 2nd part of Description of Jurassic fossils I have received nothing from you since yours of Nov. 2, 1878.

D. Baldwin

I shall order my mail to be sent from here to Abiquiu."

To this letter and a succeeding one of August 4th are appended the following field numbers, locality data and descriptions sufficient to confirm the identity of the Paleocene

mammal teeth concerned which also still retain their original field designation slips (A and A, etc.).

List of Registered Package No. 6
Animas City Colo. July 12—1879

Package contains A & A, A & B, A & C, A & D, A & E [YPM accession no. 1247]

A. & A [YPM 11887] found west side Animas River, Taos Co., New Mexico, June 21st, 1879, near Cox's Ranch.

A & B [YPM 14459] one molar in piece lower jaw. Found south side San Juan River, Taos Co., New Mexico, June 28th, 1879, First Canon west of Cañon Largo.

A & C [YPM 14476] found on La Plata side of divide between Animas and La Plata rivers Ute Reservation Colcrado July 9th, 1879—two molars in cement.

A & D Ute Reservation near A and C, July 9th, 1879.

A & E Ute Reservation La Plata side of divide July 10th, 1879 Piece of lower jaw teeth broken off—unmarked.

D. Baldwin

List of bones sent by mail from Abiquiu August 4th,
1879, [YPM accession no. 1259].

A & F [YPM 14461] from south side San Juan River, Taos Co., New Mexico four miles west of mouth of Cañon Largo—weathered fragments of skull mammal July 21st, 1879.

A & G [YPM 14477] south side San Juan River west of Cañon Largo. One back molar—and small bones, July 22nd, 1879.

D. Baldwin

Although the above listed localities are somewhat inexact, any locality data at all is rather unusual for the nineteenth century and is an evidence of the type of precision which Marsh

consistently expected of his collectors. It must be remembered that some specimens secured in the 1870's (and even much later) by other institutions cannot now be located stratigraphically within the particular intermontane basin of their provenance. Taking the evidence of Baldwin's correspondence and the collection labels reproduced here, these initial finds of Paleocene Mammalia appear to have come from two different areas (Figure 1) about fifteen to twenty miles apart. The first being approximately between the towns of La Plata and Aztec, perhaps close to localities worked later by Granger in 1916 for the AMNH, while the second set of material apparently came from a spot six or seven miles north of Angel Peak on the south side of the San Juan River.

Although much of the material sent in at this time by Baldwin is insufficient for identification, three of the specimens of the July 12, 1879 shipment and two of the shipment of August 4 are adequate for generic and probable specific assignment. Although these scanty fragments provide little of morphologic or taxonomic interest, when taken together they do show that these initial discoveries are of species of Torrejonian rather than Puercan provincial age. The taxonomic position of these specimens is as follows: 1.) YPM 11887, *Periptychus rhabdodon*, fragmentary horizontal rami of both mandibles, with damaged left P_4 and right M_3 ; 2.) YPM 14459, *Periptychus rhabdodon*, mandibular fragment with left M_1 ; 3.) YPM 14461, *Periptychus* cf. *P. carinidens* maxillary fragment with a worn right M^2 ; 4.) YPM 14476, *Tetraclaenodon* cf. *T. puercensis*, left maxilla with M^{2-3} (M^3 larger than most *T. puercensis*, but close to *T. puercensis* AMNH 3937); 5.) YPM, 14477, *Neoclaenodon* cf. *N. procyonoides* M^2 and associated bone fragments.

The first of the above listed specimens, YPM 11887, was described by Marsh (1894:260) as the type of "*Eohyus robustus*." This was the only specimen from Baldwin's Paleocene collection at the Peabody Museum to which Marsh gave taxonomic attention. The latter, by 1894, had recognized that YPM 11887 and associated materials were from "the so-called Puerco deposits" (actually Torrejon horizons) thus

lying considerably lower stratigraphically than the Wasatchian age beds to the east in which *Coryphodon* occurs as the commonest guide fossil. Marsh (1877:362) first mentioned the genus "*Eohyus*" from the "*Coryphodon* beds" but did not designate a species name and did not describe his material except to observe that "these remains are clearly Suilline in character, . . ." In 1894 he designated a species for this Wasatchian, Eocene specimen, "*Eohyus distans*," the type of which consisted of a single upper right third molar figured by him (1894:261). In the opinion of Professor Marsh (1894:260) Cope's genus *Periptychus* was a junior synonym of *Eohyus*. It is clear, however, that this is not the case. Whatever "*Eohyus distans*" is (the specimen cannot now be located), if from the "*Coryphodon* beds" as stated by Marsh, it cannot take priority over *Periptychus*, for the latter genus does not range into the Eocene. Moreover, Gazin (1955:10) regarded "*Eohyus*" as probably indeterminate. There can be little doubt that the "type" of "*Eohyus distans*" was from an Eocene horizon, for at the time of its first mention (1877) Baldwin had not yet begun to collect in areas which could have yielded Paleocene materials. Consequently, both Marsh's generic and species designations of "*Eohyus robustus*" are invalid. The "type" (YPM 11887) is a member of *Periptychus*, as was first noted by Sinclair (1914:267). The latter genus has clear priority over *Eohyus* through the description of *P. carinidens* by E. D. Cope (1881a:337). Moreover, YPM 11887 may be assigned with some confidence to *Periptychus rhabdodon*, a Torrejonian Paleocene species.

CONCLUSIONS

A small series of fossil mammals and other vertebrates, five of which can be taxonomically identified with some certainty, collected by David Baldwin for O. C. Marsh in the spring and summer of 1879, comprise the first continental Paleocene fauna to be discovered in the New World. Baldwin's pioneer collecting activities in Northwestern New Mexico are traced as they relate to this major discovery from his field label records, maps and correspondence preserved at the Yale Peabody Mu-

seum of Natural History. The species "*Eohyus robustus*" Marsh (1894) based on one of the specimens discovered in 1879 by Baldwin is a junior synonym of *Periptychus rhabdodon*, a Torrejonian, Paleocene condylarth.

REFERENCES

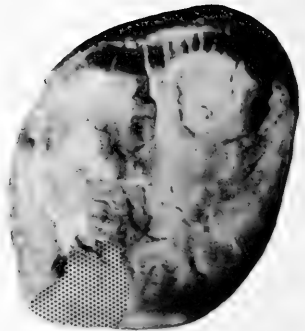
- Cope, E. D., 1881a. Mammalia of the Lower Eocene beds. *Am. Nat.*, p. 337-338.
- Cope, E. D., 1881. On some Mammalia of the Lowest Eocene Beds of New Mexico. *Proc. Am. Philos. Soc.* 19: 485-495.
- Gazin, C. L., 1955. A review of the upper Eocene Artiodactyla of North America. *Smiths. Misc. Coll.*, 128(8): 1-96.
- Marsh, O. C., 1877. Introduction and succession of vertebrate life in America. *Am. Jour. Sci. ser. 3*, 14: 338-378
- Marsh, O. C., 1894. Description of Tertiary artiodactyles. *Am. Jour. Sci.* 47: 259-274.
- Schuchert, C., 1939. Othniel Charles Marsh 1831-1899. *Biog. Mem. Nat. Acad. Sci.* 20 (1): 1-78.
- Schuchert, C. and LeVene, Clara M., 1940. *O. C. Marsh, Pioneer in Paleontology*, Yale Press, New Haven, ix + 541 p.
- Simpson, G. G., 1951. Hayden, Cope, and the Eocene of New Mexico. *Proc. Acad. Nat. Sci. of Phila.* Vol. c III. p. 1-21, April 25, 1951.
- Sinclair, W. J., 1914. A revision of the bunodont Artiodactyla of the middle and lower Eocene of North America. *Bull. Amer. Mus. Nat. Hist.* 33: 267-295.
-

Figure 1.

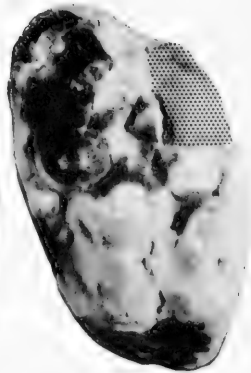
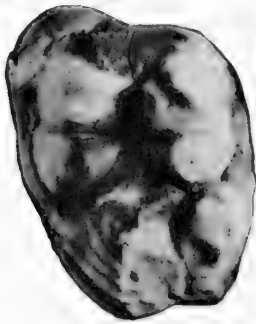
The first geological map of the North American Continental Paleocene, prepared by David Baldwin in April, 1879. The areas of two discoveries of Paleocene Mammalia made by him during that year are indicated by stipple.



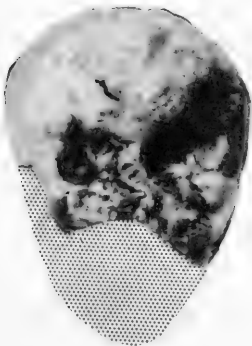
YPM 14477



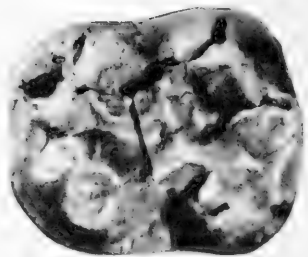
YPM 14461



YPM 14476



YPM 11887



YPM 14459

Figure 2. The initial five Paleocene mammals discovered in North America. Damaged areas stippled.

- YPM 14477. *Neoclaenodon* cf. *N. procyonoides* M² and associated bone fragments.
- YPM 14461. *Peripitychus* cf. *P. carinidens* maxillary fragment with a worn right M².
- YPM 14476. *Tetraclaenodon* cf. *T. puercensis*, left maxilla with M²⁻³ (M³ larger than most *T. puercensis*, but close to *T. puercensis* AMNH 3937).
- YPM 11887. *Peripitychus rhabdodon*, fragmentary horizontal rami of both mandibles, with damaged left P₁ and right M₃.
- YPM 14459. *Peripitychus rhabdodon*, mandibular fragment with left M₁.





3 2044 066 305 236

Date Due

~~JAN 1974~~

~~MAR 1976~~

~~AUG 78~~

