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LATE MIOCENE MAMMALS FROM OAXACA, MEXICO

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ABSTRACT. Mammalian remains from tuffaceous sedimentary rock in Valle de Nejapa, Oajaca, are the first vertebrates older than Pliocene to be recorded from Mexico or Central America. The genera *Merychippus and ?Oxydactylus* are represented. Though the fossils inadequately represent the fauna, they are not older than Hemingfordian (middle Miocene) nor later than Barstovian (late Miocene). The size and height or crown in the cheekteeth of *Merychippus* is more suggestive of Barstovian. A new faunal name, *El Gramal*, is proposed.

A recent discovery (January and February 1952) of Miocene mammalian remains along the Pan-American highway about halfway between the cities of Oajaca and Tehuantepec gives us our first evidence of pre-Pliocene continental vertebrates between the Panama Canal and United States-Mexico border. These specimens were found by J. Wyatt Durham and A. R. V. Arellano who, with Joseph H. Peck and the writer, were on a project sponsored by the Associates in Tropical Biogeography at the University of California, to search for evidence for a Tertiary marine connection across the Isthmus of Tehuantepec (Durham, Arellano, and Peck, 1952). Olson and McGrew (1941) have reported a rather meager assemblage of Hemphillian (early middle Pliocene) species from western Honduras, but these are related to Pliocene species in the United States and throw no light on the earlier Tertiary record in Central America and southern Mexico.

Unfortunately, only the genera can be identified in these Miocene specimens, but additional careful search in the formation should yield better materials and give us a much clearer picture of the late Miocene land mammals in that region.

OBSERVATION ON THE STRATIGRAPHY

The specimens were found near the ranch house El Gramal south of the village of Nejapa in the northwest part of Valle de Nejapa. El Gramal is on the Pan-American highway near kilometer 668 where the highway crosses Arroyo El Gramal. This area is approximately halfway between Oajaca and Tehuantepec.

The first discovery was part of an upper cheektooth. This was found by Arellano in a sandy conglomerate member in a road cut on the east side of the highway 1120 meters south of ranch house El Gramal (loc. V5207). The second and most significant find was by Durham in a dry gully about 300 meters west of El Gramal. It was a grayish brown tuffaceous concretion with black bone exposed. The specimen was found in the middle of the gully but its original source could not have been more than 15 meters upstream (V5208).

We did not have time to map or even adequately prospect the tuffaceous sediments in Valle de Nejapa. There are excellent exposures in the road cuts between the village El Camarón and El Gramal. The valley containing these Miocene sediments is probably 15 kilometers long and perhaps 3 kilometers wide; the formation is about 200-300 meters thick. The best exposures are to the southwest of Camarón where J. W. Durham (observation from air) has estimated that they may continue for at least 15 kilometers farther. This is

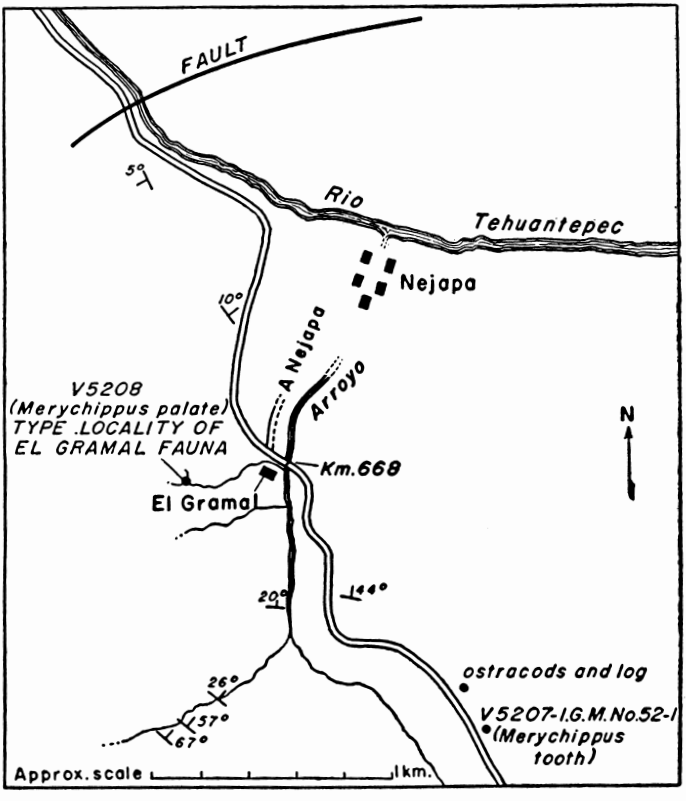

Fig. 1. Sketch of type locality of El Gramal fauna. Not drawn to scale. Drawn by Owen J. Poe.

a rather open, rolling, brushy pasture land. The gravel residue on the surface makes footing insecure in many places. Exposures could be seen to the south of El Camarón and beyond the Rio Tehuantepec north of Nejapa. These sedimentary rocks are in fault contact with igneous rocks at the northern edge of the valley.

The formation is predominately tuffaceous and composed of folded claystones, sandstones, and conglomerate members. The tuffs are rhyolitic or dacitic with hornblende, biotite, and very fine glassy materials. This is particularly true of the finer sands and claystones which vary from grays to greens and to grayish brown in color. The coarser sandstones are made up of quartz, feldspar, plagioclase and biotite flakes with opal cementation. Some heavier conglomerate members were also observed.

Locally and at different times there were lakes or ponds that appear to have dried up as indicated by the presence of ostracods, indurated mudcracks and gypsum. Fossil wood in these deposits was not uncommon.

DESCRIPTION OF EL GRAMAL FAUNA

Merychippus

The best specimen is part of a palate with most of the right maxillary and both premaxillaries preserved, right I^{1-3} (anterior parts of I^{1-2} broken off), C, $P^1 - M^3$ in place, left I^{1-3} (I^1 broken), C, $P^1 - P^3$ in place; proximal ends of right metatarsals II and III, distal end of femur, part of tibial shaft, U. C. Mus. Pal. no. 42293, U. C. loc. no. V5208.

This was an old individual with the teeth heavily worn. The palate is slightly crushed with the left side shifted a few millimeters forward. The exposed lateral lower surface of the maxillary indicates that the lacrimal fossa was not deep.

Length from anterior angle of P^2 to posterior edge opposite postfossette on M^3 111.4 mm; anterior angle of P^2 to posterior edge opposite postfossette on P^4 60.5 mm; anterior edge of M^1 opposite prefossette to posterior edge opposite postfossette on M^3 52.4 mm; diastem between I^3 and C 14.5 mm; diastem between C and P^1 26.2 mm; width between outer basal borders of canines 33.7 mm; faint remnant of base of cup in I^3; canine little worn, anteroposterior and transverse basal dimensions of canine 9.4 mm x 6.9 mm; P^1 large but heavily worn, length 13.8 mm; other premolars and molars worn to within 9 mm of base on labial side and 4 mm of base on lingual side; P^2 with prefossette opening lingually through postprotoconal valley; inner tip of postprotoconal valley isolated as small enamel lake in P^3, P^4, and M^1.

The El Gramal specimen is slightly smaller than Cope's type of *Merychippus sejunctus* (Osborn, 1918, pl. 16, fig. 3) from the Pawnee Creek of northeast Colorado. The Pawnee Creek specimen is not as heavily worn as the one from Mexico but they show a marked similarity not only in size but in the prefossette opening lingually through the postprotoconal valley on P^2 and in the isolation of the inner tip of the postprotoconal valley in P^3, P^4 and M^1. These features are foreshadowed in some of the specimens of *Merychippus primus* (Osborn) from the Sheep Creek Hemingfordian (middle Miocene) of western Nebraska.

The first specimen found includes the prefossettes and postfossettes of an upper cheektooth. These structures are preserved to their bases. The edges of the fossettes show only slight wear. The tooth fragment is curved and it contains cement in the fossettes. The height from the base to the top of the fossettes is 37 mm. This tends to indicate that the height of crown in this tooth was more than 40 mm and hence is referable to a Barstovian (late Miocene) age. The length from the anterior edge of the prefossette to the posterior edge of the postfossette is 17 mm. Inst. Geol. Mexico, no. 52-1. U. C. loc. no. 5207.

?Oxydactylus

In the concretion with the *Merychippus* palate and limb bones is the distal 135 mm of a small camelid cannonbone. This specimen looks very much like that of certain *Oxydactylus* species from the Great Plains region. The distal ends of the two shafts diverge slightly and are not fused, though they probably were coalesced in the proximal half of the bone. Width across face

of distal facets 19 mm; width of shaft 20 mm above facet 15 mm. U. C. Mus. Pal. no. 42294.

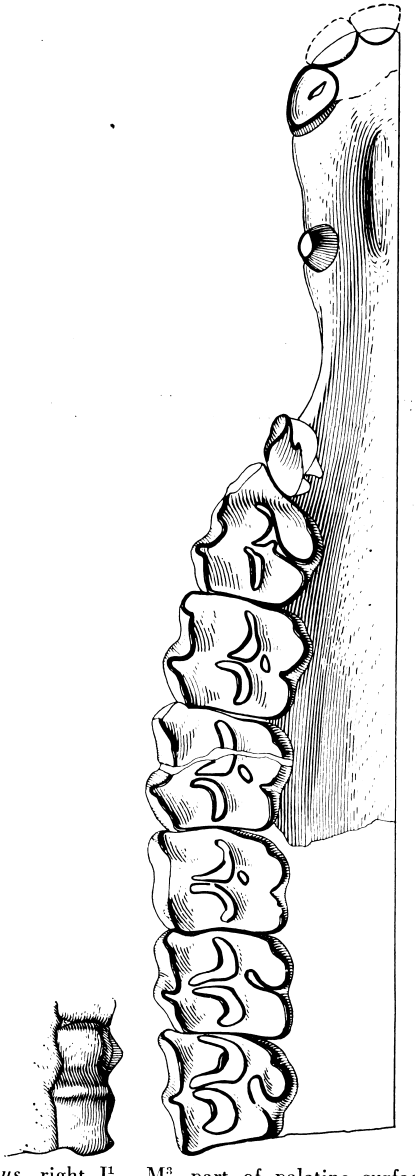

Fig. 2. *Merychippus*, right $I^1 - M^3$, part of palatine surface, and labial view of M^3, U. C. Mus. Pal. no. 42293. 2/3 natural size. El Gramal fauna, Valle de Nejapa, Oajaca, Mexico. Drawn by Owen J. Poe.

CONCLUSIONS

The tuffaceous sediments in the Valle de Nejapa are not named because of the incomplete evidence on the formation available. The vertebrate remains

are referred to as the *El Gramal* fauna (new name). The type locality is 300 meters west of El Gramal, Kilometer 668 Pan-American highway. U. C. Mus. Pal. no. V5208.

Though camelids referable to the genus *Oxydactylus* occur in the early and middle Miocene in the United States, it is thought that representatives of the genus may have survived later in lower latitudes. The *Merychippus* specimens though incomplete are suggestive of a Barstovian (late Miocene) age. This is evidenced in the size and height of crown in the cheekteeth. The beds are not older than Hemingfordian (middle Miocene) nor later than Barstovian (late Miocene).

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