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CENSUS OF PALEOCENE MAMMALS

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In the course of a general review of the Paleocene and more detailed work on particular Paleocene mammalian faunas it was necessary to compile a list of all the definitely identified genera yet found in the Paleocene formations of the world. The information is widely scattered in over a hundred papers by twenty-five or thirty authors, and the publication of this generic list will facilitate not only the task of identifying Paleocene mammals but also any effort to learn something of these important faunas.

The formations recognized and their designations in the list are as follows:

Europe: Cernaysian, a local stratum in the upper part of the Thanetian, Upper Paleocene, in the Mont de Berru at Cernay-les-Reims, near Reims, France. Designated as "Cernay." A few of these genera, but no others, have also been found elsewhere in the Thanetian.

Asia: Gashato, an Upper Paleocene formation of very limited known extent at Shabarakh Usu in Outer Mongolia (the Mongolian Republic). Designated "Gashato."

South America: Río Chico, a formation probably of Upper Paleocene age in and near the coastal region of central and southern Chubut (central Patagonia), Argentina. The isolated faunules may be of different ages. Genera found in the uppermost stratum, transitional to the Casamayor Eocene, are designated "Upper Río Chico," others simply "Río Chico."

North America: Puerco, so designated, restricted to the true Puerco, Lower Paleocene of the San Juan Basin, New Mexico. Torrejon, so designated, restricted to the true Torrejon, Middle Paleocene, of the San Juan Basin, New Mexico. Tiffany, so designated, restricted to the true Tiffany, earlier Upper Paleocene of the northern San Juan Basin, Colorado.

Ruby, so designated, a formation of Upper Paleocene and Lower Eocene age in western Colorado. Only occurrences in the lower

Ruby, Paleocene are listed.

Paskapoo, so designated, of Alberta, Canada. The formation may cover a wider span, but the known mammals are all of Upper Paleocene age.

Fort Union, a group of formations covering most or, in places, all of the Paleocene. The name "Fort Union" is used very differently by different authors and has become very ambiguous. The important faunas are: that of the Crazy Mountain Field, central Montana, designated "Crazy Mountain Fort Union," the fossils all of approximately Torrejon age as far as known; that found at Bear Creek, southern Montana, designated "Bear Creek," of Upper Paleocene approximately Tiffany age or slightly later; and the three successive faunas found by Jepsen in Park County, northern Wyoming, designated "Fort Union 'Puerco,' " "Fort Union 'Torrejon,' " and "Fort Union 'Tiffany,' " from their age equivalence. Local names for these divisions are necessary but not published.

Clark Fork, so designated, later Upper Paleocene of the Clark Fork-Bighorn Basin, northern Wyoming, between the "Fort Union 'Tiffany' " and Sand Coulee, Lower Eocene.

In addition to the published literature, most of the original collections have been examined and Matthew's unpublished Puerco-Torrejon memoir read. Unpublished genera are not listed, but in several cases genera named in papers still in press when this manuscript was written are included. The latest revisions and my own opinion derived from the specimens are followed in the taxonomy, and synonymous genera are not listed. Genera marked * also occur in the Lower Eocene; others are confined to the horizons noted.

MULTITUBERCULATA

Ptilodontidae

Kimbetohia	Simpson, 1936. Puerco.
Eucosmodon	Matthew and Granger, 1921. Puerco, Torrejon, Fort Union "Torrejon," Crazy Mountain Fort Union.
Ptilodus	Cope, 1881. Torrejon, Crazy Mountain Fort Union, Fort Union "Torrejon," Fort Union "Tiffany?," Paskapoo?
Ectypodus	Matthew and Granger, 1921, Tiffany, Fort Union "Tiffany," Paskapoo, Crazy Mountain Fort Union?
**Parectypodus*	Jepsen, 1930. Fort Union "Tiffany," Crazy Mountain Fort Union, Clark Fork.
Microcosmodon	Jepsen, 1930. Fort Union "Tiffany."
Neoplagiaulax	Lemoine, 1882. Cernay.
Liotomus	Cope, 1884. Cernay.

Taeniolabididae	
Taeniolabis	Cope, 1882. Puerco.
Catopsalis	Cope, 1882. Torrejon, Paskapoo.
Prionessus	Matthew and Granger, 1925. Gashato.
Sphenopsalis	Matthew, Granger and Simpson, 1928. Gashato.
MARSUPIALIA	
Didelphidae	
Thylacodon	Matthew and Granger, 1921. Puerco.
Peradectes	Matthew and Granger, 1921. Tiffany.
Borhyaenidae	
**Patene*	Simpson, 1935. Río Chico.
Polydolopidae	
**Polydolops*	Ameghino, 1897. Río Chico.
Seumadia	Simpson, 1935. Río Chico.
INSECTIVORA	
?Deltatheridiidae	
Gelastops	Simpson, 1935. Crazy Mountain Fort Union.
Palaeoryctidae[1]	
Palaeoryctes	Matthew, 1913. Torrejon.
Leptictidae	
Prodiacodon	Matthew, 1929. Torrejon, Crazy Mountain Fort Union.
Acmeodon	Matthew and Granger, 1921. Torrejon.
Myrmecoboides	Gidley, 1915. Crazy Mountain Fort Union.
Emperodon	Simpson, 1935. Crazy Mountain Fort Union.
Leptacodon	Matthew and Granger, 1921. Tiffany, Fort Union "Tiffany," Bear Creek, Crazy Mountain Fort Union.
Xenacodon	Matthew and Granger, 1921. Tiffany.
Litolestes	Jepsen, 1930. Fort Union "Tiffany."
**Diacodon*	Cope, 1875. Fort Union "Tiffany," Paskapoo.
**Adapisorex*	Lemoine, 1883. Cernay.
Praolestes	Matthew, Granger and Simpson, 1929. Gashato.
Nyctitheriidae	
Stilpnodon	Simpson, 1935. Crazy Mountain Fort Union.
Protentomodon	Simpson, 1928. Bear Creek.
Pantolestidae	
Pentacodon	Scott, 1892. Torrejon, Bear Creek?
Aphronorus	Simpson, 1935. Crazy Mountain Fort Union.
**Palaeosinopa*	Matthew, 1901. Fort Union "Torrejon," Crazy Mountain Fort Union.
Propalaeosinopa	Simpson, 1927. Paskapoo.
Apheliscidae	
**Apheliscus*	Cope, 1875. Clark Fork.
Mixodectidae	
Mixodectes	Cope, 1883. Torrejon.
Indrodon	Cope, 1884. Torrejon.
Eudaemonema	Simpson, 1935. Crazy Mountain Fort Union.

[1] This and other notations, [1] to [9], in this list refer to notes on page 8.

?Insectivora inc. sed.

Picrodus	Douglass, 1908. Crazy Mountain Fort Union.
Coriphagus	Douglass, 1908.[2] Crazy Mountain Fort Union, Torrejon.
Megopterna	Douglass, 1908. Crazy Mountain Fort Union.
**Adapisoriculus*	Lemoine, 1885.[3] Cernay.
Pseudictops	Matthew, Granger and Simpson, 1929. Gashato.

TILLODONTIA

Esthonychidae

**Esthonyx*	Cope, 1874. Clark Fork.

?DERMOPTERA

Plagiomenidae

Planetetherium	Simpson, 1928. Bear Creek.

?CHIROPTERA

?Phyllostomatidae

Zanycteris	Matthew, 1917. Tiffany.

PRIMATES

Plesiadapidae

Pronothodectes	Gidley, 1923. Crazy Mountain Fort Union.
**Plesiadapis*[4]	Gervais, 1877. Cernay, Tiffany, Fort Union "Tiffany," Bear Creek, Paskapoo, Clark Fork.
Chiromyoides	Stehlin, 1916. Cernay.

Apatemyidae

Labidolemur	Matthew and Granger, 1921. Tiffany, Bear Creek.

Carpolestidae

Elphidotarsius	Gidley, 1923. Crazy Mountain Fort Union.
Carpodaptes	Matthew and Granger, 1921. Tiffany.
Carpolestes	Simpson, 1928. Bear Creek, Clark Fork.

?Anaptomorphidae

Paromomys	Gidley, 1923. Crazy Mountain Fort Union.
Palaechthon	Gidley, 1923. Crazy Mountain Fort Union.
Palenochtha	Simpson, 1935. Crazy Mountain Fort Union.
Plesiolestes	Jepsen, 1930. Fort Union "Torrejon."
Navajovius	Matthew and Granger, 1921. Tiffany.

Primates inc. sed.

**Phenacolemur*	Matthew, 1915. Tiffany, Fort Union "Tiffany."

TAENIODONTA

Stylinodontidae

Wortmania	Hay, 1899. Puerco.
Psittacotherium	Cope, 1882. Torrejon, Crazy Mountain Fort Union.
(*Psittacotherium* or **Calamodon* Cope, 1874).	Bear Creek, Ruby.
Onychodectes	Cope, 1888. Puerco.
Conoryctes	Cope, 1881. Torrejon, Crazy Mountain Fort Union.

EDENTATA	
Metacheiromyidae	
**Palaeanodon*	Matthew, 1918. Clark Fork.
Dasypodidae	
Gen. indet.	Río Chico.
RODENTIA	
Eurymylidae	
Eurymylus	Matthew and Granger, 1925. Gashato.
Ischyromyidae[5]	
CARNIVORA	
Arctocyonidae[6]	
Carcinodon	Scott, 1892. Puerco.
Loxolophus	Cope, 1885. Puerco. Fort Union "Puerco."
Oxyclaenus	Cope, 1884. Puerco.
Paradoxodon	Scott, 1892. Puerco.
**Chriacus*	Cope, 1883. Puerco,[7] Torrejon, Fort Union "Torrejon," Crazy Mountain Fort Union, Tiffany, Paskapoo.
Metachriacus	Simpson, 1935. Crazy Mountain Fort Union.
Tricentes	Cope, 1884. Torrejon, Fort Union "Torrejon," Crazy Mountain Fort Union.
Spanoxyodon	Simpson, 1935. Crazy Mountain Fort Union.
Protogonodon	Scott, 1892. Puerco.
Deuterogonodon	Simpson, 1935. Crazy Mountain Fort Union.
Prothryptacodon	Simpson, 1935. Crazy Mountain Fort Union.
**Thryptacodon*	Matthew, 1915. Tiffany, Bear Creek, Clark Fork.
Arctocyonides	Lemoine, 1891. Cernay.
Claenodon	Scott, 1892. Torrejon, Fort Union "Torrejon," Crazy Mountain Fort Union.
Arctocyon	Blainville, 1841. Cernay.
[Inc. sed.]	
Deltatherium	Cope, 1881. Torrejon.
Elpidophorus	Simpson, 1927. Paskapoo.
Hyracolestes	Matthew and Granger, 1925. Gashato.
Triisodontidae	
Eoconodon	Matthew and Granger, 1921. Puerco, Fort Union "Puerco."
Goniacodon	Cope, 1888. Torrejon.
Triisodon	Cope, 1881. Torrejon.
Mesonychidae	
**Dissacus*	Cope, 1881. Torrejon, Tiffany?, Bear Creek, Clark Fork, Cernay.
Microclaenodon	Scott, 1892. Torrejon.
Oxyaenidae	
**Oxyaena*	Cope, 1874. Clark Fork.
**Dipsalidictis*	Matthew, 1915. Clark Fork.
Dipsalodon	Jepsen, 1930. Clark Fork.

?Hyaenodontidae	
Opisthopsalis	Matthew, Granger and Simpson, 1929. Gashato.
Miacidae	
**Didymictis*	Cope, 1875. Torrejon, Crazy Mountain Fort Union, Clark Fork.
Ictidopappus	Simpson, 1935. Crazy Mountain Fort Union.
Carnivora inc. sed.	
Sarcodon	Matthew and Granger, 1925. Gashato.
CONDYLARTHRA	
Phenacodontidae	
Tetraclaenodon	Scott, 1892. Torrejon, Fort Union "Torrejon," Crazy Mountain Fort Union.
Gidleyina	Simpson, 1935. Crazy Mountain Fort Union.
**Phenacodus*	Cope, 1873. Tiffany, Fort Union "Tiffany," Bear Creek, Paskapoo, Clark Fork.
**Ectocion*	Cope, 1882. Fort Union "Tiffany," Paskapoo, Clark Fork.
Meniscotheriidae	
**Meniscotherium*	Cope, 1874. Paskapoo, Clark Fork.
Pleuraspidotherium	Lemoine, 1878. Cernay.
Orthaspidotherium	Lemoine, 1885. Cernay.
Hyopsodontidae	
Mioclaenus	Cope, 1881. Torrejon.
Oxyacodon	Osborn and Earle, 1895. Puerco, Fort Union "Puerco."
Tiznatzinia	Simpson, 1936. Puerco.
Ellipsodon	Scott, 1892. Torrejon, Crazy Mountain Fort Union.
Protoselene	Matthew, 1897. Torrejon.
Litaletes	Simpson, 1935. Crazy Mountain Fort Union.
Litomylus	Simpson, 1935. Crazy Mountain Fort Union.
**Haplomylus*	Matthew, 1915. Clark Fork.
Haplaletes	Simpson, 1935. Crazy Mountain Fort Union.
Phenacodaptes	Jepsen, 1930,[8] Fort Union "Tiffany."
Didolodontidae	
**Ernestokokenia*	Ameghino, 1901. Río Chico.
?Condylarthra inc. sed.	
Phenacolophus	Matthew and Granger, 1925. Gashato.
AMBLYPODA	
Pantolambdidae	
Pantolambda	Cope, 1882. Torrejon, Crazy Mountain Fort Union.
Titanoides	Gidley, 1917. Fort Union (near Buford, South Dakota), Ruby, Fort Union "Tiffany."
Coryphodontidae	
**Coryphodon*	Owen, 1845. Clark Fork.
Periptychidae	
Ectoconus	Cope, 1884. Puerco.
Conacodon	Matthew, 1897. Puerco, Fort Union "Puerco."

Hemithlaeus	Cope, 1882. Puerco.
Anisonchus	Cope, 1881. Puerco, Torrejon, Crazy Mountain Fort Union (also from an oil well in Louisana).
Haploconus	Cope, 1882. Torrejon.
Plagioptychus	Matthew, 1936. Puerco.
Periptychus	Cope, 1881. Torrejon, Tiffany.
Tricuspiodontidae	
Tricuspiodon	Lemoine, 1885. Cernay.
DINOCERATA	
Uintatheriidae	
**Probathyopsis*	Simpson, 1929. Clark Fork.
Prodinoceras	Matthew, Granger and Simpson, 1929. Gashato.
LITOPTERNA	
?Proterotheriidae	
Wainka	Simpson, 1935. Río Chico.
**Victorlemoinea*	Ameghino, 1901. Río Chico.
**Ricardolydekkeria*	Ameghino, 1901. Río Chico.
**Josepholeidya*	Ameghino, 1901. Río Chico.
NOTOUNGULATA	
Arctostylopidae	
Palaeostylops[9]	Matthew and Granger, 1929. Gashato.
Henricosborniidae	
**Henricosbornia*	Ameghino, 1901. Río Chico.
?**Polystylops*	Ameghino, 1904. Río Chico.
?**Postpithecus*	Ameghino, 1901. Río Chico.
?Notostylopidae	
Gen. indet.	Río Chico.
Isotemnidae	
**Isotemnus*	Ameghino, 1897. Río Chico.
Notopithecidae	
?**Notopithecus*	Ameghino, 1897. Río Chico.
?**Transpithecus*	Ameghino, 1901. Río Chico.
Acoelodidae	
Kibenikhoria	Simpson, 1935. Río Chico.
Notoungulata inc. sed.	
Seudenius	Simpson, 1935. Río Chico.
ASTRAPOTHERIA	
Trigonostylopidae	
**Trigonostylops*	Ameghino, 1897. Río Chico.
?Trigonostylopoidea inc. sed.	
Shecenia	Simpson, 1935. Río Chico.
Mammalia inc. sed.	
Gashternia	Simpson, 1935. Río Chico.
Carodnia	Simpson, 1935. Río Chico.
Ctalecarodnia	Simpson, 1935. Río Chico.

NOTES ON THE FAUNAL LIST

1. There is an unpublished probably palaeoryctid, but possibly deltatheridiid, genus in the Puerco (Reynolds).
2. *Coriphagus* may be an oxyclaenid. *Mixoclaenus* Matthew and Granger, 1921, is synonymous with it.
3. *Adapisoriculus* may be either didelphid or nyctitheriid. Referred specimens from the Lower Eocene are nyctitheriids, but their pertinence to the genus is not certain.
4. The survival of *Plesiadapis*, as such, into the Lower Eocene depends on an aberrant species that may not be placed in this genus when better known.
5. The occurrence of any ally of *Paramys* in the Upper Paleocene is known from a still undescribed specimen (Jepsen). I am indebted to Dr. Jepsen for the opportunity to include this very important new datum here.
6. There is an undescribed oxyclaenid genus in the Puerco (Reynolds).
7. The occurrence of *Chriacus* in the Puerco is known from an undescribed specimen (Simpson). It is very unlikely that one genus ranges from Lower Paleocene to Lower Eocene, but it cannot be split up on present data.
8. Jepsen referred *Phenacodaptes* to the Artiodactyla, with a query. This may be its true position, but so far as known to me the evidence much more strongly favors reference to the Hyopsodontidae.
9. *Palaeostylops* may include two related genera.

NUMERICAL RÉSUMÉ

The numbers of families and genera listed are of some interest as affording a criterion of the richness of the faunas and the status of our knowledge of them. They are as follows:

Whole Paleocene of the World

Families:

Confined to the Paleocene	8
Cretaceous, Paleocene, and later	4
Paleocene and later	29
Later families doubtful in the Paleocene	6
Total	47

Genera:

Confined to the Paleocene	113
Paleocene and Eocene	29
Eocene genera doubtful in the Paleocene	5
Undetermined but generically distinct from other Paleocene forms	2
Total	149

(Unpublished but known genera would add at least two confined to the Paleocene, making the present known total 151.)

North America

Lower Paleocene (Puerco and equivalents)

Families:

Cretaceous, Paleocene, and later	2
Lower Paleocene to Eocene or later	3
Lower to Upper Paleocene	2
Lower to Middle Paleocene	1
Total	8

Genera:

Confined to the Lower Paleocene	18
Lower Paleocene to Middle Paleocene	2
Lower Paleocene to Eocene	1
Total	21

Middle Paleocene (Torrejon and equivalents)

Families:

Cretaceous, Paleocene, and later	3
Lower Paleocene to Eocene or later	3
Lower to Upper Paleocene	2
Lower to Middle Paleocene	1
Middle Paleocene only	1
Middle to Upper Paleocene	2
Middle Paleocene to Eocene or later	7
Total	19

Genera:

Lower Paleocene to Eocene	1
Lower to Middle Paleocene	2
Middle Paleocene only	43
Middle and Upper Paleocene	5
Middle Paleocene to Eocene	2
Total	53

Upper Paleocene (Tiffany, Clark Fork, and equivalents)

Families:

Cretaceous, Paleocene, and later	3
Lower Paleocene to Eocene or later	3
Lower to Upper Paleocene	2
Middle Paleocene to Eocene or later	6
Middle to Upper Paleocene	2
Upper Paleocene and later	13
Total	29

Genera:

Lower Paleocene to Eocene	1
Middle Paleocene to Eocene	2
Middle to Upper Paleocene	6
Upper Paleocene only	18
Upper Paleocene and Eocene	15
Total	42

Europe—Cernaysian

Families:

Paleocene only (in Europe)	4[1]
Paleocene and Eocene or later	4
Total	8

Genera:

Paleocene only (in Europe)	9
Paleocene and Eocene	3
Total	12

Asia—Gashato

Families:

Paleocene only (in Asia)	5[2]
Paleocene and Eocene or later	2
Total	7

Genera:

Paleocene only	11
Total	11

South America—Río Chico

Families:

Paleocene and Eocene or later	11
Total	11

Genera:

Paleocene only	9
Paleocene and Eocene	12
Total	21

Except in the first list, for the whole world, doubtful identifications have been listed without distinction from those more certain.

[1] Three of these occur also in the Eocene in America and probably will be found there in Europe.

[2] Two of these occur also in the Eocene in North America.

BIBLIOGRAPHY OF TYPE DESCRIPTIONS OF VALID GENERA KNOWN FROM THE PALEOCENE

The types of genera marked * are from the Eocene and in these cases the type description therefore does not refer primarily or at all to the occurrence of the genus in the Paleocene. Several other genera have since been found in the Eocene, but the type description is based on Paleocene occurrences. Including only type generic references, this bibliography is very much less extensive than would be one including all description and discussion of the Paleocene faunas.

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[1] This paper is going to press at about the same time as the present list, and will be American Museum Novitates, No. 849