Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
Vol. LXI. No. 1.

NEW FOSSIL MAMMALS FROM CUBA

By G. M. Allen.

With One Plate.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
January, 1917.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION:—

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NEW FOSSIL MAMMALS FROM CUBA.

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CAMBRIDGE, MASS., U. S. A.:
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JANUARY, 1917.

No. 1.— *New Fossil Mammals from Cuba.*

By Glover M. Allen.

The recent discoveries of fossil mammals in Porto Rico, San Domingo, and Cuba (Anthony, 1916, 1916a; Miller, 1916a) indicate the former existence in these islands of a very interesting and remarkable assemblage of indigenous species many of which have probably become extinct within only very recent times. The remains hitherto discovered represent five extinct genera of hystricine rodents (not including Amblyrhiza of Anguilla and St. Martin's), at least two genera of ground sloths, and a new family of insectivores (Nesophontidae). Further systematic search will doubtless disclose additional remains on other of the Antillean islands, the study of which must throw much light on the distributional problems of the West Indies.

The Museum of Comparative Zoölogy has received from Professor Carlos de la Torre, the distinguished Cuban naturalist, a fragment of bone-breccia obtained in the Province of Matanzas, Cuba, from a '*caverna*' — cleft or cavity as distinguished from '*cueva*,' a large cave. This block is less than one fourth of a cubic foot in volume, and apparently represents a complete section of the floor deposit, some four inches thick. The bottom portion consists of red cave earth, and a few limestone pebbles with much admixture of minute bone-fragments. The more superficial portion is almost entirely composed of small mammalian bones, indistinctly stratified, for the greater part crushed to microscopic fragments. The whole mass is mixed with particles of cave earth, and solidly cemented together by the deposition of lime from infiltrating water. As to the age of the deposit, there is of course no indication beyond the fact of its having been laid down in a cavern of no great antiquity. Presumably it is of Pleistocene or even more recent age.

In spite of the very fragmentary nature of the bones, and the solidity with which they were cemented together, a number of nearly complete jaws and palates were extricated. Lower jaws, as usual in such deposits, are best preserved and most frequent; portions of long bones, though common, were usually too broken to be of value. A careful study of the jaws and teeth recovered, reveals three very interesting new species. The first is an insectivore of a type probably

related to the newly described Nesophontes of Porto Rico. It is, however, a much smaller animal, and is likely to prove a representative of still another genus, though on account of the fragmentary nature of the only jaw discovered, this is still uncertain. The two other species are hystricine rodents, the one a small mouse-like species, probably related to Brotomys and Boromys (Miller, 1916a), the other a member of the short-tailed group of Capromys, for which Chapman (1901) proposed the subgenus Geocapromys. The last species forms by far the greater part of the bone fragments.

The subgenus Geocapromys has hitherto been known from three living forms only — *brownii*, *thoracatus*, and *ingrahami*, confined respectively to Jamaica, Little Swan Island, and Plana Keys (Bahamas). The discovery of a recently extinct species in Cuba is therefore important, as bridging in part the hiatus between the last two species, and definitely adding Cuba to the known range of the group. A study of all the living species of Capromys as at present understood, reveals an excellent tooth character by which the short-tailed members of the group may be distinguished, namely, the presence of an additional antero-internal reentrant in the enamel pattern of the first lower molariform tooth (pm_4). This, in addition to other cranial and external characters, in part already pointed out by Chapman, is, I think, sufficient to raise Geocapromys to generic rank, as a related but more specialized group.

In working out the relations of the Cuban Geocapromys, it became necessary to consider more carefully Chapman's *Capromys columbianus*. This was described on the basis of two subfossil fragments of the maxillary with the palate, found in a cave near Trinidad, Cuba, buried a few inches from the surface. Associated with these were a molar (probably the last one in an upper series) and portions of bones which were doubtfully referred to the same species. The molar is, without much question, from a species of Capromys, but Chapman's excellent figure and description leave no doubt that his *C. columbianus* is an animal very different from other known forms of that genus. Indeed, as I have previously suggested (1911, p. 212) it is not even congeneric. Through the kindness of Mr. H. E. Anthony of the American Museum of Natural History, I have lately had the privilege of examining the type specimens and find my previous conclusions fully substantiated. In order to bring out more clearly the peculiarities of this animal, and to obviate any misconceptions of distribution that may arise through considering it a fourth Cuban species of Capromys, I therefore propose for it a new generic term:

Synodontomys, gen. nov.

Type Species.—*Capromys columbianus* Chapman (1892, p. 314, fig. 3).

Generic Characters.— A Capromys-like animal of the size of *C. pilorides*, with a V-shaped palate that narrows anteriorly until the anteriormost molariform teeth (pm^4) nearly touch the median axis, and are only separated from each other by the thin bony walls of their alveoli. Pattern of upper cheek teeth apparently similar to that of Capromys, with two outer reentrant folds of enamel and one median inner fold; but apparently these folds slope rather strongly forward (as indicated by the forward direction of the small vertical ridges of the alveoli) instead of being as in Capromys nearly transverse. In outline the molariform teeth are very nearly square instead of elongate or rectangular as in Capromys, and are subequal in size.

In the close approximation of the maxillary tooth rows, this genus recalls Myocastor, but differs in the tooth structure.

The three species found among the fragments in the block of bone-breccia from Matanzas are the following.

INSECTIVORA.

?Nesophontes micrus, sp. nov.

Plate, fig. 14.

Type.— A posterior half of the right ramus, containing a part of pm_4, m_1, m_2, and the roots of m_3, M. C. Z. 9600. From a cavern in the Sierra of Hato-Nuevo, Province of Matanzas, Cuba. Carlos de la Torre.

Description.— The fragment indicates an animal considerably smaller than *Nesophontes edithae* of Porto Rico, but the jaw was evidently similar in the general form of the angulare and the ascending process. The ramus, however, seems proportionally more slender, without the depth of curve beneath the molars. The molars differ from those of the type species of Nesophontes (1) in being less elongate in the axis of the tooth row; (2) in decreasing in size from m_1 to m_3; (3) in lacking a certain 'plumpness' of form that is found in Solenodon as well; and (4) in the lack of a space between the posterior border of m_3 and the ascending process of the mandible.

The fragment contains traces of two roots of a pm_3, and a nearly complete pm_4 which, as in *N. edithae*, is two-rooted with a prominent posterior cingulum cusp. Both first and second lower molars have a cingulum on the anterior half of the outer aspect. Their cusps are sharp, the paraconid equalling the hypoconid in vertical height. The protoconid is higher than the metaconid, which it nearly hides in side view, though its summit is a very little posterior to that of the metaconid. The entoconid and the hypoconid are of equal height, the former very slightly anterior to the latter in side view (Plate, fig. 14). There seems to be also a minute hypoconulid. The condyle of the jaw is not in condition for thorough comparison.

Measurements.— Front of pm_4 to ascending process of mandible, 7.5 mm.; front of pm_4 to back of m_2, 5.5; length of m_1, 2.3; of m_2, 2.0; depth of ramus at front of m_2, 2.4.

Specimen examined.— The type.

Remarks.— While agreeing in the general structure of the teeth so far as this can be determined from the specimen, there are such evident differences of proportion and size as to render it unlikely that this jaw is from a species of Nesophontes. Nevertheless the similarity is sufficient to associate it with that genus until better material may be discovered to prove its relationships are otherwise. Certainly the present fragment is insufficient for the founding of still another genus. The teeth are of a rather primitive type and clearly indicate a fourth species of Antillean insectivore.

RODENTIA.

Boromys torrei, sp. nov.

Plate, fig. 10–13.

Type.— A palate with root of right zygomatic arch, pm^4 and alveolar row of right side, m^1 and posterior part of alveolar row of left side, M. C. Z. 9601. From a cavern in the Sierra of Hato-Nuevo, Province of Matanzas, Cuba. Carlos de la Torre.

Description.— Resembles *Brotomys voratus* of San Domingo and *Boromys offella* of Cuba, but differs from both in its much smaller size and the deeper indentation of the posterior emargination of the palate, which reaches forward to the level of the center of m^2. It is not possible to determine whether there is a supplemental groove at the base of the antorbital foramen, the chief cranial character distin-

guishing Boromys from Brotomys. In the tooth pattern, however, the type specimen seems to correspond more nearly to the description of Boromys, to which I shall provisionally refer it.

The essential feature of the molars in both genera is probably the same, though Boromys, so far as at present known, seems to have deeper anterior secondary folds of the enamel. The upper molars have each a deep median enamel fold on the inner and the outer side, that meet at the middle of the tooth. The anterior half has another fold from the exterior, which though extending a trifle beyond the median line of the tooth, is of less vertical extent than the primary fold. The posterior half has a similar secondary fold extending inward from the palatal side of the tooth. As Miller points out, the posterior secondary fold is smaller than the anterior, so that the minute enamel lake to which it eventually is reduced by wear, disappears before the anterior lake, a condition which appears to obtain in the type here described. In this specimen the second molariform tooth, m^1, is more worn than the first, pm^4, so that it has a large lake of enamel in its anterior half and a smaller round one in its posterior, whereas pm^4 has the anterior secondary fold still strongly connected with the external enamel wall, while the posterior secondary fold is reduced to a small round dot. Both these upper teeth are slightly everted. In the empty alveoli, the cavities of three roots are seen, two anterior, and a third posterior occupying the breadth of the cavity. The anterior edge of pm^4 is on a level with the posterior edge of the zygomatic root.

In addition to the type palate, several lower jaws were found, which though dissociated, unquestionably belong to this species. All are of uniform size. The lower incisor is strong, its base curving back and out, to end slightly above and external to the alveolar row of the molars. Its anterior enamel face is orange-yellow in color, in contrast to the very shining white of the molars. As in the upper molars the outer median enamel fold (Plate, fig. 11) has its tip very slightly posterior to that of the inner fold. A minute round enamel lake is present in both anterior and posterior halves of the first tooth, pm_4, but in the posterior half only of the two succeeding teeth, m_1 and m_2. In this respect the lower molars differ from those of Steiromys, which has a secondary reentrant in the anterior lobe of the molars. None of the specimens shows m_3 in place. Two isolated teeth, evidently lower molars, show clearly that there is no secondary reentrant in the anterior half, but that it is present in the posterior half only (Plate fig. 12).

Measurements.— Alveolar length of upper tooth row, 7.6 mm.; width of alveolus of m^1, 2.1; width of palate outside alveoli of m^1, 6.4; width of palate outside alveoli of m^3, 6.5; length of crown of pm^4, 2.0; of m^1, 1.9; width between alveoli of m^2 (front corners), 2.1; lower jaw, diastema, 4.1; alveolar length of lower tooth row, 7.0; length of pm_4, 2.0; of m_1, 1.7; of m_2, 1.7.

Specimens examined.— The type palate, eight lower jaws, and two separate lower molars.

Remarks.— Notwithstanding the similarity in general structure of the enamel pattern, it is unlikely that this small species will prove to be a member either of Brotomys or Boromys, if indeed the two latter are really as distinct as supposed. The structure of the palate is different in the present form and this coupled with its much less size presupposes further important differences. Until better material is available, however, it may stand provisionally with Boromys. The pattern of the upper molars, as Miller (1916a) remarks is not very different from that of Stichomys and it might be added, of Asteromys.

It is a pleasure to associate with this interesting discovery, the name of Professor de la Torre, whose investigations have so greatly enriched our knowledge of the natural history of Cuba.

The second species of rodent discovered, belongs to the group of short-tailed Capromys-like animals, a group to which I here assign generic rank. It may be defined as follows.

Geocapromys Chapman (1901, p. 314).

Type Species.— By selection, *Capromys brownii* Fischer.

Generic Characters.— Like Capromys, but the tail little, if any longer than the hind foot with claws; the thumb much more reduced so as to be scarcely evident. The most important cranial character is the presence of an additional antero-internal enamel fold in the first lower cheek-tooth, making three evident reentrants on the lingual side, instead of two, as in Capromys, a character which in view of the relatively small amount of variation in the enamel pattern of the two genera, assumes here considerable importance (Plate, fig. 1–6, 8). In addition, the upper tooth rows are more strongly convergent anteriorly and the zygomatic portion of the maxillary is broader than in Capromys.

Three living species are included in this genus. Of these, *Geocapromys brownii*, of Jamaica, is the largest. The two others, *G. thoraca-*

tus of Little Swan Island, and *G. ingrahami* of Plana Keys, Bahamas, are smaller, and much more resemble each other in their gray type of coloring than they do the large dark brown animal of Jamaica. As Chapman pointed out, these may indicate two species-groups. The recent discovery in Jamaica of fossil jaws indistinguishable from those of *G. thoracatus* (Miller, 1916) may further indicate that both species-groups formerly were represented in that island. An additional character of value is the color of the incisors. These are deep yellow in adults of all species of Capromys. In *Geocapromys brownii* and *ingrahami* they are very pale yellow, almost whitish; while in *G. thoracatus* and the new fossil species described below from Cuba, the incisors are ivory-white. The Cuban species may be known as

Geocapromys cubanus, sp. nov.

Plate, fig. 7–9.

Type.— Portion of the right lower ramus of an immature animal, showing the incisor and three anterior cheek-teeth in place, M. C. Z. 9602. From the Sierra of Hato-Nuevo, Province of Matanzas, Cuba. Carlos de la Torre.

Description.— A species slightly smaller than *G. ingrahami*, but with relatively broader molars, when adult. The reentrants are relatively deeper, narrower, and more nearly parallel-sided, giving the pattern an appearance of greater compression in the direction of the jaw's axis. The anteriormost inner reentrant of pm_4 is relatively deeper than in any of the existing species, and reaches to the mid-line of the tooth (Plate, fig. 8). The incisors are slender and white. The palate (M. C. Z. 9603) shows the strongly contracted tooth rows and narrow median bony ridge characteristic of the genus. The broken condition of the palates discloses the fact that the alveoli of the upper molar rows, though 2 mm. apart at the point where the teeth emerge, are nearly in contact at the upper level of their roots, as if foreshadowing the condition in Synodontomys in which the tooth rows are practically in contact at the level of the palate.

The enamel pattern of adult specimens more nearly resembles that of *G. brownii* of Jamaica than it does either of the other living species. Young individuals have a more open pattern showing less compression and depth of the enamel folds, but intermediate conditions link these extremes in the series at hand. The palate ends at about the

level of the middle of m^3, without the median bony projection found in *G. thoracatus*.

Measurements.— Length of lower diastema of type, 7 mm.; of pm_4, 3.1; of m_1, 3; length of lower molar row in an adult, (9604), 14.3; of pm_4, 4; of m_1, 3.5; of m_2, 3.0; width of m_1, in same specimen, 3.7; length of upper molar row (9603), 13.2; distance between tooth rows anteriorly, 1.8; posteriorly, 5.6; width across anterior corners of alveoli of cheek teeth, 7; width of m^1, 3.6.

Specimens examined.— Five palates with teeth, about 15 jaw fragments mostly with teeth, and numerous other fragments.

Remarks.— The relationship of the fossil Cuban Geocapromys, seems on the whole to be with *G. brownii* in the relatively broad molars with their deep, compressed enamel folds. It is nearer *G. ingrahami* in size, though even smaller; and further resembles that species in the form of the terminal part of the bony palate, which is arched and lacks the distinct median projection seen in *G. thoracatus*. The remains of this extinct Cuban species compose most of the original block of bone-breccia which forms the subject of this paper. The bones are so greatly broken, however, that it was impossible to extricate any except the dental portions of the skull and a few ear bullae.

GENERAL REMARKS.

While it is premature to speculate on the significance of the recently discovered fossil mammals in Cuba, Porto Rico, and San Domingo, it is clear that the additional facts of distribution tend to confirm the evidence for a former continuity of the Greater Antillean land masses. Thus Geocapromys is now known from Little Swan Island, Jamaica, Cuba, and Plana Keys, with probably two types in Jamaica. A Cuban insectivore related to the fossil Nesophontes of Porto Rico parallels the presence of Solenodon on Cuba and San Domingo. The Isolobodon of Porto Rico is indistinguishable from that of San Domingo. Related genera of rodents — Brotomys and Boromys — are found to occur in San Domingo and Cuba respectively. These, and other cases among reptiles (Barbour, 1914), birds, and mammals seem to imply a consistent rather than a haphazard method of distribution, the most obvious explanation of which seems to be that the Antillean land mass was formerly of larger extent and that the several islands now representing it were once connected. The dismemberment of

this hypothetical land mass into islands, whether by depression, by the erosion of ocean currents, or by other geological processes, has separated members of a once more homogeneous fauna, and through long isolation they have in many cases developed racial variations on the different islands.

The time is not ripe for conclusions as to the place and method of origin of the West Indian fauna. The evidence of fossil mammals is still inconclusive. For while the numerous species and genera of sloths and hystricine rodents recall strongly the characteristic South American forms, the hystricines are of wide distribution in both hemispheres, and insectivores are, so far as known, wholly absent from South America until very recent times. Nevertheless the more obvious view seems to be that the mammal fauna reached these areas at a rather remote time, perhaps in part as more primitive types in a retreat before a fauna of more specialized invaders from a northern center of distribution, as argued so ably by Matthew (1915). A severance of land connections with the continent would be then postulated, so that the ancient fauna might survive apart from further competition with more modern forms.

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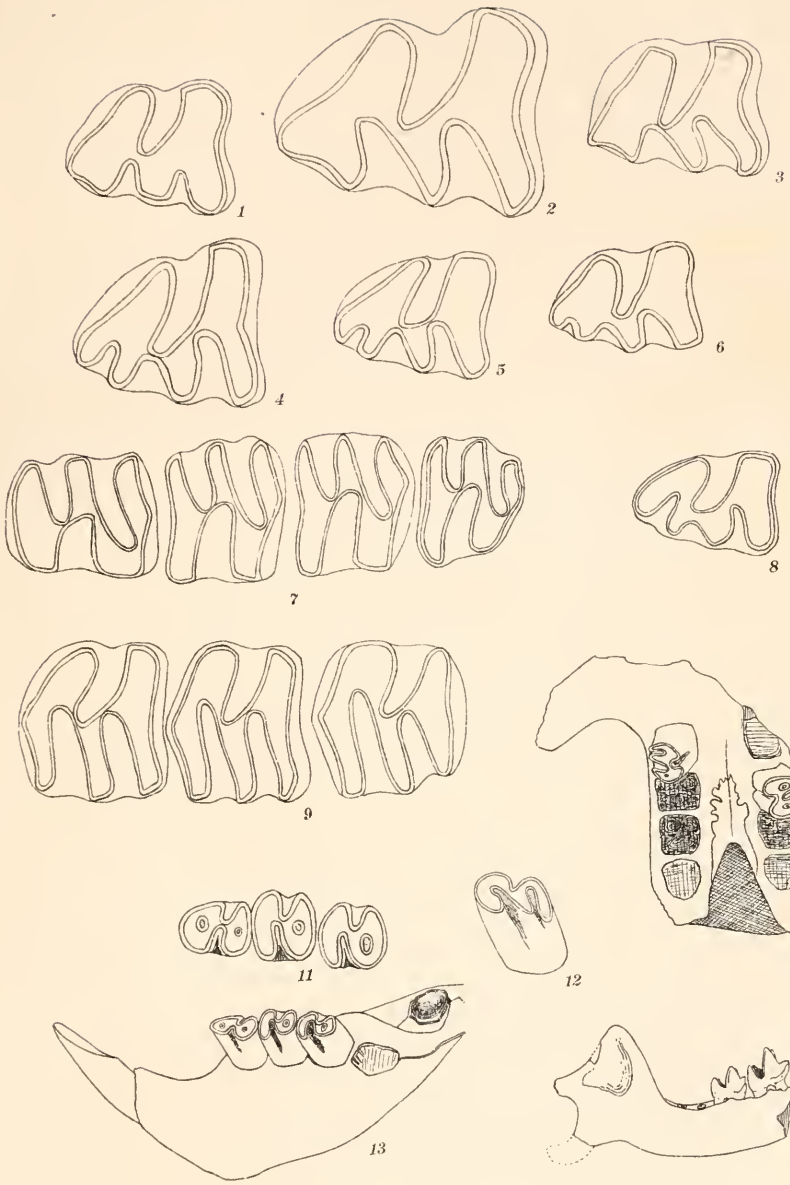
EXPLANATION OF THE PLATE.

EXPLANATION OF THE PLATE.

(All figures drawn with camera lucida).

Figs. 1–3.— First lower cheek-tooth (pm_4) of Capromys, right side.
Fig. 1.— *Capromys prehensilis.* × 5.
Fig. 2.— *C. pilorides.* × 5.
Fig. 3.— *C. melanurus.* × 5.
Figs. 4–6, 8. First lower cheek-tooth (pm_4) of Geocapromys, right side.
Fig. 4.— *Geocapromys brownii.* × 5.
Fig. 5.— *G. thoracatus.* × 5.
Fig. 6.— *G. ingrahami.* × 5.
Fig. 8.— *G. cubanus* (immature), from the type × 6.1.
Fig. 7.— Upper cheek-teeth of *Geocapromys cubanus*, to show enamel pattern. × 5.
Fig. 9.— Lower molars (m_{1-3}) of an adult *G. cubanus.* × 5+.
Fig. 10.— *Boromys torrei*, from the type, showing the form of the palate, the right upper premolar (pm^4) and left upper first molar (m^1). × 3.5.
Fig. 11.— Enamel pattern of the crowns of the three anterior cheek-teeth, lower jaw, of *Boromys torrei.* × 5.
Fig. 12.— A lower molar of *Boromys torrei*, less worn than those in the preceding figure, showing the shallow secondary reentrant. × 5.
Fig. 13.— Fragment of right lower jaw of *Boromys torrei.* × 3.
Fig. 14.— Portion of right lower jaw of ?*Nesophontes micrus*, showing pm_4, m_1, m_2, in place and roots of m_3. From the type. × 2.7.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