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SITES IN CUBA AND SANTO  
DOMINGO

(WITH ONE PLATE)

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# BONES OF MAMMALS FROM INDIAN SITES IN CUBA AND SANTO DOMINGO

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(WITH ONE PLATE)

Within the past few months the United States National Museum has received two collections of bones of mammals dug from kitchen middens in the island of Santo Domingo, West Indies. The first and most important consists of two hundred and forty-two specimens, representing probably about fifty individuals, procured at San Pedro de Macoris, by Mr. Theodoor de Booy for the Museum of the American Indian, Heye Foundation, New York City. A representative series has been presented to the National Museum by Mr. George G. Heye. The second was made during September, 1916, by Dr. W. L. Abbott in the caves near San Lorenzo where Gabb rediscovered the genus *Plagiodontia* about the year 1870. It consists of a dozen specimens all of which were given to the museum. Finally Mr. Heye has sent for examination part of a lot of bones collected at the "Big Wall," a former Indian village at Maisi, Baracoa, Cuba. These remains were found "scattered all through the site in conjunction with stone artifacts and fragments of pottery." All of this material proves to be of great interest on account of the light which it throws on the Antillean fauna that was associated with early man.

As lately as a year ago there existed wide differences of opinion as to the probability that the Antilles had ever been inhabited by a mammal-fauna of continental character.<sup>1</sup> Cope, in 1868, had pointed out that the geologically recent occurrence of a rodent (*Amblyrhiza*) as large as a Virginia deer on the island of Anguilla, whose area is only thirty square miles, indicated the former existence of a Caribbean continental area;<sup>2</sup> but this fact seems to have been generally lost sight of. It has all along been well known that bats occurred throughout the archipelago, but they were supposed to have flown

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<sup>1</sup> See "Some remarks upon Matthew's Climate and Evolution" by T. Barbour, with supplemental note by W. D. Matthew. Ann. N. Y. Acad. Sci., Vol. 27, pp. 1-15. January 25, 1916.

<sup>2</sup> Proc. Acad. Nat. Sci. Philadelphia, 1868, p. 313.

to the islands.<sup>1</sup> Chance or man might have accounted for the presence of a few raccoons, agoutis, and cricetine rodents, especially in the Lesser Antilles. The same was equally true of the hystricine rodents (*Capromys*) of Cuba and Jamaica. The Cuban ground-sloths were supposed to have been descended from ancestors which "arrived" from South America in the Miocene or from Central America in the Pliocene. The insectivore *Solenodon* of Cuba and Santo Domingo was so peculiar as to be scarcely within the range of speculation; while *Plagiodontia*, the indigenous rodent of Santo Domingo, lost since 1836, had almost passed out of mind.

In February, 1916, when recording Gabb's rediscovery of *Plagiodontia*, I said that the presence in the West Indies of three rodents so different from each other as *Plagiodontia*, *Capromys* and *Amblyrhiza* indicated the probability of a once-abundant Antillean representation of the hystricines.<sup>2</sup> Soon after my note was published I received from Dr. J. A. Allen his account of *Isolobodon portoricensis*, a previously unknown rodent from Porto Rico.<sup>3</sup> In August Mr. H. E. Anthony described<sup>4</sup> three further new genera of extinct Porto Rican mammals: a ground-sloth and two rodents, *Elasmodontomys* and *Neopsomys*. He also recorded (p. 194) a "fragmentary mandibular ramus, too incomplete for present determination, of a large hystricomorph rodent" apparently representing a peculiar genus. The material from Cuba and Santo Domingo adds still another genus of rodents from each island; it further includes the femora of two species not hitherto observed. All of these recently identified rodents are hystricine, while there is every reason to suppose that this is likewise the case with the undeterminable species. The number of well established Antillean genera has thus been increased within the year practically from two to eight, with the indication that at least one additional genus and perhaps more may be represented among the three<sup>5</sup> species (one from Porto Rico and two from Santo Domingo) whose status is now in doubt.

<sup>1</sup> That the geographic distribution of bats should not be regarded as primarily a question of flight has been pointed out by Dobson (Rep. Brit. Ass. Adv. Sci. for 1878, pp. 158-167), G. M. Allen (Bull. Mus. Comp. Zool., Vol. 54, pp. 175-176, 1911), and Andersen (Catal. Chiropt. Brit. Mus., Vol. 1, pp. lxxvi-lxxvii, 1912; see also Science, N. S., Vol. 36, pp. 526-527, October 18, 1912).

<sup>2</sup> Proc. Biol. Soc. Washington, Vol. 29, p. 47. February 24, 1916.

<sup>3</sup> Ann. New York Acad. Sci., Vol. 27, pp. 17-22. January 25, 1916.

<sup>4</sup> Ann. New York Acad. Sci., Vol. 27, pp. 193-203. August 9, 1916.

<sup>5</sup> The long bones (from Anguilla) of a supposed rodent about the size of an agouti described and figured by Cope (Smithsonian Contr. Knowl., Vol. 25, pp. 3-4, pl. 1, figs. 4-6, 1883) are excluded as evidently those of a housecat.

With the characters of so many genera known it becomes possible to gain some idea of the aspect of the Antillean hystricine fauna. The most noticeable feature of these genera considered as a group is their similarity to the Santa Cruzian and Entrerian rodents which Ameghino and Scott have described and figured. In no instance has the same genus been found in both the West Indies and Argentina or Patagonia; but the Antillean rodents thus far discovered never show such peculiarities that their remains would appear out of place among those of their extinct southern relatives, while as a whole they would at once be recognized as foreign to the present South American fauna. The large *Amblyrhiza* has teeth fundamentally more like those of the Entrerian *Megamys laurillardi* than like those of the living viscacha. Its plantigrade foot indicates relationship with the enormous extinct Patagonian rodents rather than with any existing saltatorial animals. Similarly the teeth of *Elasmodontomys*, in spite of their relatively small size, appear from Mr. Anthony's figures to be built on a plan identical with that of the molars of *Megamys patagonicus* (Entrerian), but with the same specialization of the anterior wall of each enamel loop that is seen in the simpler teeth of *Amblyrhiza*. In its peculiar outline and in the number and arrangement of the cross-ridges the upper premolar is not unlike the isolated teeth that formed the basis of the genus *Discolomys*<sup>1</sup> (Entrerian). On the other hand all the maxillary teeth of *Elasmodontomys* differ conspicuously from those of any known hystricine now living. In *Heteropsomys* the teeth are much like those of *Acaremys* (Santa Cruz) except that the crowns are more heightened. Teeth of this same type occur in the recent *Cercomys*, *Carterodon* and *Euryzygomatomys*; but the genus *Heteropsomys* differs from all the living spiny-rats in the form of the skull, most notably in the small size of the antorbital foramen. Of the newly-discovered Santo Domingan genus the only skull has the teeth so worn that their fundamental structure is no longer clear, but apparently this structure resembled that seen in the Santa Cruzian *Sciamys* rather than in any living echimyid. In the new genus from Cuba the teeth are, by all essential characters, exactly like those of the Santa Cruzian *Stichomys*.<sup>2</sup> Of the three known genera which still exist (if *Plagiodontia* has not been exterminated within the last few decades), *Capromys* has

<sup>1</sup> Particularly the specimen figured by Burmeister. Anal. Mus. Nac. Buenos Aires, Vol. 3, pl. 2, fig. 6. 1885. Ameghino, Mam. Fos. Argent., pl. 6, fig. 23. 1889.

<sup>2</sup> See Scott, Rep. Princeton Univ. Exped. Patagonia, pl. 65, figs. 17 and 19.

teeth based on the *Acaremys* plan, while *Plagiodontia* and *Isolobodon* have teeth with the same underlying structure as those of *Scleromys* (Santa Cruz), a type which recurs in the living *Abrocoma* and certain species now placed in *Proechimys*. Except that *Capromys* is represented on the mainland by the slightly different *Procapromys* of Venezuela, these three living genera stand alone as compared with all the nearly-related South American hystricines, both living and fossil, in their complete attainment of ever-growing teeth.

So far as can be judged from eight very distinct genera the Antillean hystricine rodents do not present the characters that would be expected in animals derived from South America during any period geologically recent. Neither have they the appearance of an assemblage brought together at different times by migration or chance introduction. On the contrary they suggest direct descent from such a part of a general South American fauna, probably not less ancient than that of the Miocene, as might have been isolated by a splitting off of the archipelago from the mainland. Of later influence from the continent there is no trace.

#### CANID. Species?

The left mandible of a canid with  $pm_2$ ,  $pm_3$  and  $pm_4$  in place (No. 217139, U. S. Nat. Mus.) is among the specimens in the Cuban collection. It differs from the jaws of such Indian dogs as I have seen (both North American and South American) in the unusual width of the premolars and the complete absence of secondary cusps on all three of these teeth. A toothless left maxilla (No. 217130) from the same locality closely resembles the maxilla of a domestic dog's skull from pre-Columbian deposits near Lomas, Peru (No. 176386).

#### CAPROMYS PILORIDES (Say)

Represented by numerous skulls and leg bones from Big Wall.

#### CAPROMYS PREHENSILIS Poeppig

A right mandible and left femur from Big Wall are probably referable to this species.

#### ISOLOBODON PORTORICENSIS Allen

(Plate I, fig. 3)

*Macoris*: 207 specimens (representing probably about 40 individuals): palate 1; lower jaw (right) 5, (left) 11; auditory bulla, 1; odd cheek teeth (mandibular) 22; lower incisor 1; scapula (left)

2; humerus (right) 18, (left) 8; radius (right) 2, (left) 2; ulna (right) 2, (left) 2; innominate (right) 7, (left) 3; sacrum 3; femur (right) 28, (left) 36; tibia (right) 28, (left) 25.

*San Lorenzo*: 2 left lower jaws.

On the basis of the present material, even after comparison with the numerous Porto Rican specimens kindly lent me by Dr. Allen, I am unable to find any character by which to distinguish the Santo Domingan *Isolobodon* from that of the neighboring island. This animal is by far the most abundantly represented of the mammals found in the Macoris deposits. It must have been common at San Lorenzo as well, for two of the three jaws which Gabb collected there and I recorded as *Plagiodontia* turn out to be *Isolobodon*. One of these specimens lacks all of the teeth while in the other the first and second teeth are lost and the third and fourth are broken away to below the alveolar level. Under these circumstances and before I had seen the description of *Isolobodon* I overlooked their true characters. Among the bones found at San Lorenzo by Dr. Abbott this genus is absent.

The tooth structure in *Isolobodon* is essentially like that of *Plagiodontia* except that the upper premolar retains a small antero-external reentrant fold, the reentrant folds in each of the molars and the main folds in the premolar are opposite, their tips coming in contact at middle of crown, and in the lower teeth the outer reentrant angle is much deeper than those of the inner side. The cement in the teeth of *Isolobodon* is of a peculiarly open structure, showing conspicuous horizontal striation.

#### PLAGIODONTIA AEDIUM F. Cuvier

(Plate I, fig. 4)

*Macoris*: 15 specimens (representing probably about 6 individuals): lower jaw (right) 1, (left) 1; humerus (right) 2, (left) 1; innominate (right) 1, (left) 1; femur (right) 2, (left) 4; tibia (right) 1, (left) 1.

*San Lorenzo*: 8 specimens (representing probably 3 individuals): anterior half of skull with complete dentition of right side, 1; left lower jaw, 1; innominate, 3; femur, 1; tibia, 2.

*Measurements*: No. 217112 (San Lorenzo): bregma to front of premaxillaries, 53.6; length of frontal along median suture, 26.6; least interorbital breadth, 19.0; breadth of rostrum across upper rim of premaxillaries, 12.8; diastema, 17.2; maxillary toothrow (alveoli), 21.0; crown of m<sup>1</sup>, 5.2 x 4.8. No. 217126 (Macoris):

length of mandible, 58+ ; depth of mandible through articular process, 16.6; mandibular toothrow (alveoli), 23.8; crown of  $m_1$ , 5.8 x 5.6.

The material now at hand shows that the teeth of *Plagiodontia* were correctly figured by F. Cuvier. In the maxillary teeth the structure is uniform throughout the series though the size diminishes sensibly from first to fourth. The crowns are squarish in outline. From the postero-internal corner a narrow, parallel-sided reentrant fold extends diagonally across to near middle of anterior border. A similar fold parallel to the last extends backward from antero-external corner of crown and comes almost in contact with enamel of posterior border of tooth. No trace of other folds can be detected. In the mandibular teeth the premolar differs from the molars in the conspicuous narrowing of its anterior half. The pattern of all four teeth is fundamentally the same. On outer border there is one reentrant fold, directed slightly backward and extending less than half-way across crown. On the inner side there are two reentrant folds, each much longer than that of opposite side. The tip of the posterior inner fold comes nearly or quite in contact with that of outer fold. The obliquity of the folds in the upper teeth is so much greater than in the lower teeth that it produces an apparent lack of harmony between the two patterns. As I have already remarked the enamel patterns in both *Plagiodontia* and *Isolobodon* are specializations of a type like that found in the Miocene *Scleromys*.

**BROTOMYS, gen. nov.**

(Plate 1, fig. 1)

*Type*.—*Brotomys voratus* sp. nov.

*Characters*.—A spiny-rat about the size of *Proechimys canicollis*; skull differing from that of *Proechimys* and other living members of the group in the shorter rostrum and the greater breadth and depth of both rostrum and interorbital region; antorbital foramina very large, with no trace of secondary canal for nerve; posterior emargination of palate extending forward to middle of  $m^3$ ; teeth weak, the roots of incisors producing no swelling on sides of maxillaries, the cheekteeth subterete, each with three poorly developed roots; toothrows nearly parallel; enamel pattern of  $pm^4$  and  $m^1$  (much worn) consisting of a single median reentrant fold from each side,<sup>1</sup> the tip of the outer fold curving back behind that of the inner.

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<sup>1</sup>A minute enamel lake lies close to the inner extremity of the outer fold. This lake may indicate that the complete pattern is less simplified.



*Remarks.*—The genus *Brotomys* is remarkable for its combination of robust skull with weak teeth. It differs too widely from all of the existing genera to require any special comparisons. From the extinct *Heteropsomys* of Porto Rico (pl. 1, fig. 2) it is at once distinguishable by the relatively large antorbital foramina, horizontal anterior zygomatic roots, slightly emarginate palate, and perhaps by a more simplified enamel pattern.<sup>1</sup>

**BROTOMYS VORATUS, sp. nov.**

*Type.*—Anterior half of skull (lacking the nasal bones and second and third molars), No. 217117, U. S. National Museum, collected in kitchen midden at San Pedro de Macoris, Santo Domingo, by Theodoor de Booy. Presented by George G. Heye.

*Characters.*—As in the genus; measurements: distance from front of incisor to back of  $m^3$  (alveoli), 26.6; palatal length, 25.4; palatilar length, 23.0; probable length of nasals, about 18; interorbital breadth, 14.6; palatal breadth including alveoli of second molars, 7.2; least breadth of palate between premolars, 2.0; least breadth of palate between posterior molars, 3.2; rostral breadth across nasal rim of premaxillaries, 9.2; depth at middle of molar series, 14.8; probable depth behind incisors, about 14; maxillary toothrow (alveoli), 10.0; crown of  $m^1$ ,  $2.2 \times 2.4$ .

*Specimens examined.*—In addition to the type the following bones, probably representing about 6 individuals, all collected by Mr. de Booy at Macoris, appear to be referable to this species: humerus (right) 2, (left) 3; innominate (right) 1; femur (right) 3, (left) 2; tibia (right) 2, (left) 5.

**BOROMYS, gen. nov.**

*Type.*—*Boromys offella*, sp. nov.

*Characters.*—Similar to *Brotomys* but antorbital foramen with well developed secondary groove for nerve; roots of incisor producing an evident swelling on side of maxillary above neural groove; cheek-teeth relatively larger, but of same form and root-structure; enamel pattern of  $m^3$  (and probably of all the other maxillary teeth) consisting of two narrow reentrant folds from each side, the extremities of all the folds reaching about to median line of crown.

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<sup>1</sup>For the opportunity to examine the skull of *Heteropsomys* and for permission to publish the photographs, I am indebted to Dr. J. A. Allen and Mr. H. E. Anthony, of the American Museum of Natural History.

*Remarks.*—Though resembling *Brotomys* in its general features the genus *Boromys* seems well characterized by the presence of the supplemental groove at base of antorbital foramen. Whether the teeth are actually as different from those of *Brotomys* as they appear must remain an open question until young individuals of both genera have been procured. That the patterns will prove to be identical seems improbable. In *Boromys* the median outer and median inner loops, corresponding to those present in *Brotomys*, are more deeply sunk into the crowns than the others; hence it is evident that a stage of wear would later be reached at which the structure in the two animals would be the same. But apparently at that stage the crowns of the teeth would be longer and less nearly terete in *Boromys* than in *Brotomys*. In reaching it a different course would be followed. The lake representing the antero-external loop in *Boromys* is larger and deeper than that representing the postero-internal loop, so that it remains well developed after the latter has disappeared. In *Brotomys* the only trace of a lake is in a position behind the median external loop and exactly opposite the tip of the median internal loop, therefore not in the place where the last remnant of a postero-internal loop should occur.

The enamel pattern of *Boromys* is identical with that of *Stichomys*. As compared with the Santa Cruzian genus the Cuban animal differs (a) in the more forward position of the zygomatic root relatively to the maxillo-premaxillary suture and the toothrow, (b) in the apparent shortness of the rostrum which results from this peculiarity of the zygoma, and (c) in the narrower palate (width of palate at  $pm^4$  scarcely greater than that of alveoli). The concavity on posterior border of zygomatic root extends slightly beyond level of anterior surface of  $pm^4$ , while in *Stichomys* its most anterior portion is a little behind level of middle of this tooth.

#### BOROMYS OFFELLA, sp. nov.

*Type.*—Anterior half of skull (lacking the nasal bones, interorbital region and posterior termination of palate), No. 217138, U. S. National Museum. Collected in village site at Maisi, Baracoa, Cuba, by M. R. Harrington. Presented by George G. Heye.

*Characters.*—As in the genus; measurements: from front of incisor to back of  $m^3$  (alveoli), 29.2; palatal breadth including alveoli of second molars, 9.0; least breadth of palate between premolars, 3.0; rostral breadth across nasal rim of premaxillaries, 8.2; depth at

middle of molar series, about 17.4; maxillary toothrow (alveoli), 10.8; crown of  $m^1$ , 2.6 x 2.6.

*Specimen examined.*—The type.

#### RODENT. Genus?

The perfect left femur of an adult rodent collected by Mr. de Booy at Macoris is more slender than the corresponding bone in *Isolobodon* or *Plagiodontia*, the shaft is more compressed below, the great trochanter is narrower and the small trochanter is more abruptly emarginate on its lower border. In these peculiarities it is not approached by any individual among the numerous specimens by which the other genera are represented. As compared with the femur of *Brotomys* it differs chiefly in its much greater size (length to extremity of large trochanter 59.4 instead of 46; greatest diameter at middle 7 instead of 5.6; least diameter at middle 5.6 instead of 4.0). It may represent a large species of *Brotomys* or an unknown genus.

#### RODENT. Genus?

The incomplete right femur of a rodent collected by Dr. Abbott in a cave one-quarter of a mile from the shore at San Lorenzo probably represents another unknown species or genus. It is about the size of the femur last described, and the small trochanter is even more abruptly emarginate on its lower border. The striking peculiarity of this bone as compared with the femur in all the other Santo Domingan rodents is seen in the region lying between the upper surface of the small trochanter and the deepest portion of the digital fossa. The groove which occupies this area is usually not far from horizontal, that is, about perpendicular to the shaft of the femur. In this specimen it slopes upward at an angle of about 65°. The bone in question appears to be partly mineralized, while all the others in both collections seem essentially fresh.

#### TRICHECHUS sp.

A seacow is represented by a rib, a caudal vertebra, and the neural spine of a lumbar vertebra, all found at Macoris. The material at hand is not sufficient to make any positive determination possible.

## EXPLANATION OF PLATE

(All figures natural size)

FIG. 1. *Brotomys voraius*. Type No. 217117, U. S. Nat. Mus., Santo Domingo. (de Booy.)

FIG. 2. *Heteropsomys insulans*. Type No. 14172, Amer. Mus. Nat. Hist., Porto Rico. (Boas.)

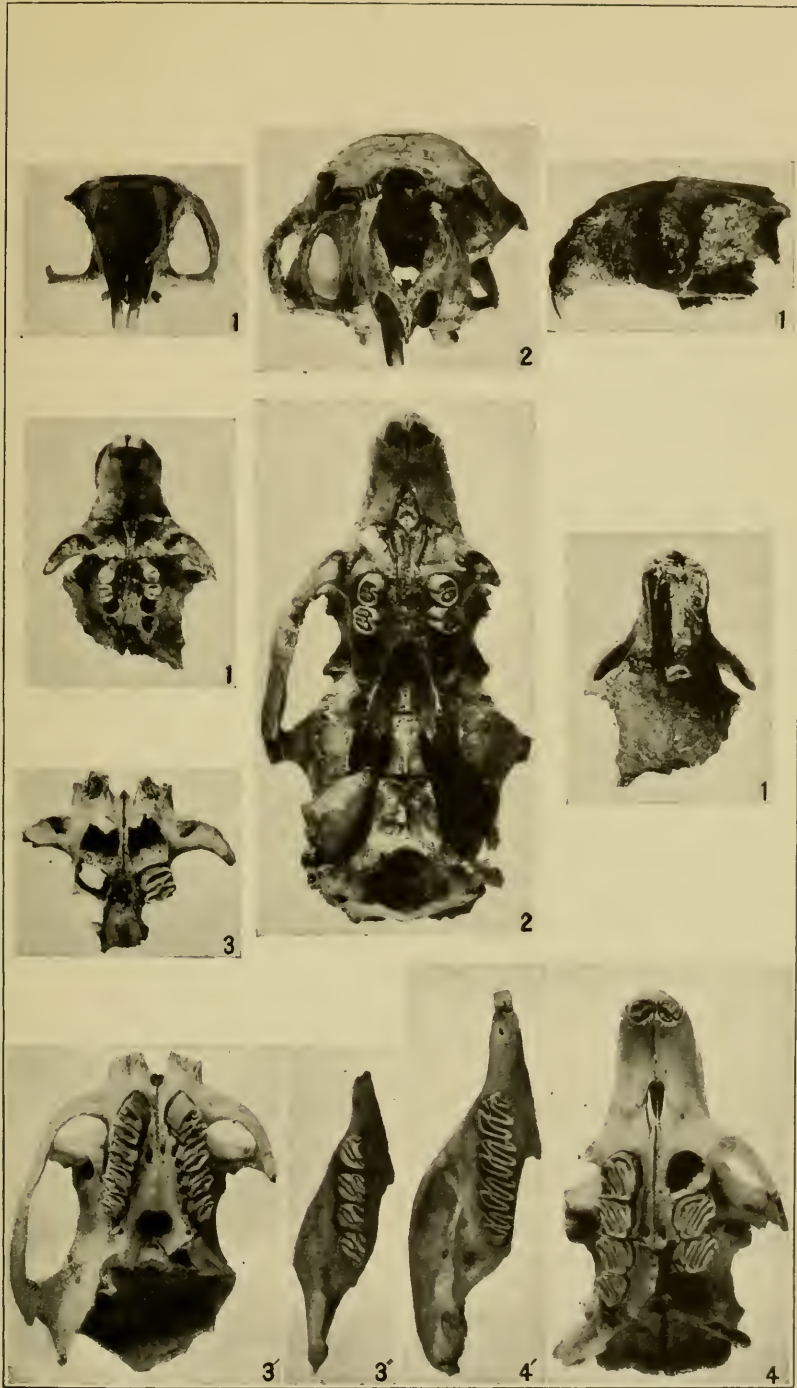
FIG. 3. *Isolobodon portoricensis*. No. 217118, U. S. Nat. Mus., Santo Domingo. (de Booy.)

FIG. 3'. *Isolobodon portoricensis*. No. 216595, U. S. Nat. Mus., Porto Rico. (Boas.)

FIG. 3". *Isolobodon portoricensis*. No. 217119, U. S. Nat. Mus., Santo Domingo. (de Booy.)

FIG. 4. *Plagiodontia acdium*. No. 217112, U. S. Nat. Mus., Santo Domingo. (Abbott.)

FIG. 4'. *Plagiodontia acdium*. No. 217126, U. S. Nat. Mus., Santo Domingo. (de Booy.)



1. BRODOMYS

2. HETEROPSOMYS

3. ISOLOBODON

4. PLAGIODONTIA

ALL NATURAL SIZE