Article XXXV. — REPORT ON MAMMALS FROM THE DISTRICT OF SANTA MARTA, COLOMBIA, COLLECTED BY MR. HERBERT H. SMITH, WITH FIELD NOTES BY MR. SMITH.

By J. A. ALLEN.

Mainly through the personal gift of President Morris K. Jesup of the American Museum of Natural History, the Museum has acquired the large collection of mammals and birds[1] made chiefly near the coast in the vicinity of Santa Marta, Colombia, under the direction of Mr. and Mrs. Herbert H. Smith, who, through previous explorations in southern Brazil, the West Indies, and Mexico, had acquired an almost world-wide reputation as expert collectors, particularly in entomology, botany, and ornithology. They took with them several assistants, and also made extensive use of the native hunters in securing the larger mammals. The first shipments reached the Museum towards the end of 1898 and during 1899; a certain number of specimens were selected, according to previous agreement, for the Museum and the others were held in storage. The final shipment reached the Museum late in 1901, and remained in the original packages till the early part of the present year when, together with the duplicates from previous shipments, they were purchased by the Museum, and the whole collection of mammals became for the first time available for examination. Much use, however, had previously been made of the available portions, as shown by the list of publications based thereon given below.

The collecting of mammals and birds formed only a part of the grand scheme of a general natural history survey of the whole Department of Magdalena, planned by Mr. Smith, but which circumstances quite unlooked for rendered impossible to carry out, his long and serious illness in the field being soon followed by a political revolution which rendered work impracticable, the immediate scene of Mr. Smith's labors being

[1] A set of duplicates was sent, by special arrangement, direct to the Carnegie Museum at Pittsburg, but subsequently most of these came under my observation.

alternately overrun by insurgent and government forces. I am greatly indebted to Mr. Smith for the following account of the physical features of the region, a detailed list of the localities at which collections were made, and for field notes on many of the species. The field notes are distinguished by marks of quotation and the initials H. H. S.

Description of the Region.

By Herbert H. Smith.

The collection of mammals and birds for the American Museum of Natural History was made during three years and a half, March, 1898, to September, 1901. My original intention had been to explore the whole Department of Magdalena; that is, northern Colombia from the Magdalena River to Venezuela, and extending from the coast over 200 miles inland. Almost in the outset, I was laid up for six months by a severe illness; subsequently my plans were frustrated by a civil war, which made travelling practically impossible. Our work was thus restricted to a comparatively small area in the northwestern corner of the Department. A brief description of this region may be useful and I shall preface it with some general remarks on the mountain region to which it belongs.

The Sierra Nevada de Santa Marta is an isolated mass about midway between Magdalena and the Venezuelan frontier, and within sight of the northern coast. It is nearly 18,000 feet high, and has a very extensive snowfield, stretching probably thirty miles from southwest to northeast. The Sierra Nevada does not belong to the Andean system; westward it is separated from one branch by the broad plains of the Magdalena, and to the east and southeast a long valley divides it from the Black Andes. This valley is drained by the river Cesar, flowing south-southwest to the Magdalena, and the river Rancheria, passing northward to the coast; the sources of these streams are close together, and the pass between them is said to be less than 1000 feet above sea-level. A depression of 1000 feet, therefore, would reduce the Sierra Nevada region to an island, separated from the continent by

a narrow channel on the east and south and a broader one on the west. This almost insular character of the region is important and should be borne in mind. It may be noted that the geological formations of the Sierra, as far as we have any knowledge of them, show no direct relations with those of the Andes. There are no active volcanoes, and no extinct ones are certainly known. Earthquakes are common in the Andean chain and their vibrations are sometimes felt simultaneously from Peru to the Caribbean Islands; but they do not affect the Sierra Nevada. The occasional slight tremors recorded are purely local.

North of the Sierra the Caribbean coast extends nearly east and west; but at Cabo de Aguja, near Santa Marta, it turns southward at a right angle; twenty miles from the point the high coast touches the plain about the great lagoon called La Cienega; beyond this the mountainous lands adjoin the plain along the north and south line. The plain and lagoon are part of the estuary system of the Magdalena.

Our explorations were made mainly within a triangle formed by the coast and the San Lorenzo Mountains. These mountains form a lower chain, trending from west-southwest to east-northeast, and are separated from the Sierra Nevada by a narrow and deep valley; the Horqueta, one of their peaks, is 8400 feet high as measured by my aneroid, and I judge that the San Lorenzo Mountains, which I did not reach, are at least 500 feet higher. To the northwest of the principal range are several lower ridges, roughly parallel to it and abutting diagonally on the northern coast. This portion of the coast is remarkably picturesque, a succession of rocky headlands with deep bays between the ridges; the bays are often backed by sand beaches and mangrove swamps of no great extent. Further east the headlands are no longer seen, and low, rolling lands extend back to the base of the Sierra Nevada.

Numerous streams rise in the San Lorenzo Mountains, flowing down through deep ravines in long series of cascades; as they approach the coast they have wide valleys with more or less alluvial land. The most important of these streams

are the rivers Cordova, Frio, Gaira, Manzanares, Piedras, Buritaca, and Don Diego. The only swamps are those of the Magdalena estuary, some small patches along the lower courses of the rivers, and the mangrove thickets.

With the exceptions noted below the whole region is covered with forest; but there are two strongly contrasted growths, which I distinguish as mountain forest and dry forest. Locally these are called mata and pampa, the latter term, in this region, including dry forest as well as grass lands.

The true mountain forest is a matted growth of trees and vines with numerous epiphytes and ferns; very few trees shed their leaves at stated seasons, and the forest is damp and verdant throughout the year. In the dry forests, on the contrary, nearly all the trees and vines are leafless during the latter part of the dry season, February to May; the few peculiar ferns die down to the roots. Grasses and herbs are abundant wherever the ground is not too shady, but they wither during the dry months. The distinction of plant species is almost complete, and is all the more remarkable because the two kinds of forest exist side by side; during the rainy months an unpractised traveller will hardly note that he is passing from one flora to another; but in March the dry forest is almost leafless, while the other is green and luxuriant.

The extreme summits of the San Lorenzo Mountains are generally without large trees, the low growth consisting of bromelias, ferns, bushes, etc. But with these exceptions the mountain forest covers everything down to a level of about 2000 feet above the sea; below that it extends in narrow lines along the river shores, sometimes to the coast. Further east, near Don Diego, the mountain forest comes down bodily to the seashore or near it.

The dry forest covers most of the remaining country, sometimes with a heavy growth of high trees, sometimes lower and more open; on dry hills near the coast it becomes 'scrub,' seldom over twenty-five feet high, but with little change of plant species. In the river valleys it is generally separated from the water by a thin line of trees like those of

the mountain forest. On ridges and hills, especially in Manzanares valley, the trees often disappear altogether or grow scattered over the open grass lands.

I have been thus explicit in describing the two kinds of forest because they exist in all parts of tropical America, and, in my opinion, the distinction is interesting and significant. The 'pampa' of the Santa Marta district is the 'campo' and 'coatinga' of Brazil, and the scrubby growth of lower hills in the West Indies; a modified form is the 'chapparal' of Mexico. Everywhere the plants are different from those of the swamp forest; generally the trees are lower, often small and gnarled and sometimes scattered; and everywhere they shed their leaves during the dry season. The difference does not always correspond to a difference of soil or situation; the two kinds of forest may adjoin each other on level ground or on a mountain side, on land equally dry or humid.

It is impossible to avoid the impression that the dry forest is an old, stunted, and worn out vegetation, tending to extinction, while the swamp forest, with its exuberant growth, is plant life in the vigor of youth. Such impressions cannot be accepted as scientific truths, yet they may point in the right direction. It appears certain that the swamp forest is gradually encroaching on the other; this can be observed nearly everywhere. It is possible that the dry forest, with its open lands or 'campos,' represents an older flora.

As yet we have no comparative lists of the plants; and until these are drawn up and we know more about the tertiary and quaternary floras of South America we can reach no definite conclusions on the question. As animals pass readily from one kind of forest to the other, it may be impossible to determine their original habitats; yet certain species and groups can be assigned with some confidence. To the dry forest region, for example, belong the deer with branched horns (except *C. palustris* [= *Odocoileus palustris*], which is an inhabitant of the river plains), all the tropical American Canidæ, hare, and all, or nearly all, the armadilloes. The puma and one or two unicolored cats affect the dry forest. The ostrich, common in the interior of Brazil, lives exclusively

on the open lands and can hardly be driven into the forest. It is much more difficult to designate the mammalia of the damp forest, because all of them wander into the dry forest where the trees are high and thick enough; such as the monkeys, the spotted Felidæ, various tree-loving carnivora, such as the kinkajou, sloths, opossums, all the deer with unbranched horns, wild hogs, and tapirs; the herbivorous species sometimes enter the open lands, but generally at night. The great anteater and tamandua seem to wander indifferently in both kinds of forest, but the little tamandua belongs in the damp forest, as does the sloth. Among rodents, pacas and squirrels may be assigned to the damp forest, as may many rats; agoutis seem to live indifferently wherever they have shade and food; capivaras belong to the river-plains. The land-shells and insects of the two kinds of forest are strongly contrasted. Among the latter, for example, *Hypocephalus* inhabits the dry-forest region of Bahia; it is a remarkable beetle combining the characters of many families; Leconte and Horn regard it as an archaic type.

I have already called attention to the semi-insular character of the Sierra Nevada, and this region also includes the San Lorenzo Mountains; with such conditions we may naturally look for some peculiar species. To some extent the collections already made bear out this supposition; certain mammalia, birds, insects, and land-shells are known only from this region. But we cannot speak confidently about them until we have larger collections from adjoining districts, and especially from the Black Andes. It is even possible that some plants may be peculiar to the Santa Marta region. My own large collection of phanerogams and ferns includes several hundred species not previously known. But plants are readily distributed by their seeds, and they are not likely to be limited by narrow valleys; probably most or all of these species will eventually be found in the Black Andes.

Following is a list of the principal localities marked on my labels. Our hunters often made long excursions and we could not tell accurately the altitudes from which specimens were brought; the figures given are approximate only.

1. *Santa Marta:* City in a bay of the same name, north of the Manzanares River; the bay is backed by salt plains and surrounded by dry hills covered with a scrubby growth (dry-forest species). Considerable tracts of the lower lands are irrigated.

2. *Bonda:* Village on the river Manzanares, 7 miles east of Santa Marta. This was our head quarters during the greater part of our stay in Colombia. The village itself is only 150 feet above sea-level, but most collections were made in somewhat higher land. The country is hilly, covered in great part with dry forest with intervals of open grass land in the ridges. A thin line of mountain forest adjoins the river.

3. *Mamatoco:* Village on the Manzanares, 2 miles below Bonda; elevation 100 feet; vegetation as at Bonda, but with more scrubby growth on the hills and some small tracts of swamp. Cantilito is a small plantation between the two villages, adjoining Quebra Mojada, a stream and ravine.

4. *El Libano:* Plantation 1 mile south of Mamatoco; elevation 150 feet. This must not be confounded with the locality of the same name among the mountains.

5. *Masinga:* Valley on the Manzanares, 1 mile above Bonda. Elevation 250 feet; vegetation as at Bonda.

6. *Masinga Vieja:* On the Manzanares, about 4 miles above Bonda, at 600 feet; it is the site of an Indian village, now abandoned. The line of mountain forest along the river has here become broader; the neighboring ridges rise to 1000 feet and are generally open and grassy.

7. *Onaca:* Plantation, 18 miles E. S. E. of Santa Marta, at the lower border of the main mountain forest, which here adjoins the open lands. Elevation 2000 feet.

8. *Jiracasaca:* Plantation near Onaca, and at about the same level.

9. *Las Nubes:* Plantation 3 miles south of Onaca, at 4500 feet; large clearings in the mountain forest. Alto de Cielo is a locality and clearing near it, at 5000 feet.

10. *Don Amo:* Plantation 18 miles east of Santa Marta, in a mountain valley, at 1500 feet; large clearings in mountain forest, with adjoining dry forest and open lands. Don Amo Viejo is a locality near it.

11. *Cacagualito:* Plantation 20 miles east of Santa Marta, 1500 feet; vegetation principally mountain forest, which here extends to a lower level. Jordan is a plantation 2 miles further east, in a valley, at 1000 feet.

12. *Taganga:* Fishing village on a bay of the same name, 2 miles northeast of Santa Marta, surrounded by low mountain ridges; the country is very dry, with a scrubby growth (dry-forest species) and

numerous cacti. The coast is rocky and high, sometimes with surf-washed caves in which bats are abundant. Guairaca, Clinto, and Neguanje are uninhabited localities on the coast further east.

13. *Buritaca:* A river entering the sea about 40 miles east of Santa Marta. The mountain forest here comes down bodily to the coast, where there are sand-beaches and mangrove-swamps; the country is low and damp. There are small tracts of open grass land near the river mouth.

14. *Don Diego:* Plantation on the coast at the mouth of the river Don Diego, five miles east of the Buritaca and with similar surface and vegetation.

15. *Minca:* Plantation on the river Gaira, 12 miles southeast of Santa Marta, at the lower border of the main mountain forest, which here adjoins dry forest and open grass lands. Elevation 2000 feet.

16. *Agua Dulce:* Plantation 2 miles southeast of Minca, at 2400 feet; large clearings in mountain forest.

17. *Valparaiso:* Plantation near the head of the river Gaira, 20 miles southeast of Santa Marta, 4500 feet. Extensive clearings in the mountain forest. Las Purtidas is a locality near it at 3500 feet.

18. *El Libano,* Cerro del Libano, or Sierra del Libano (names used by American planters): This is a locality rather than a mountain, and we camped there for several weeks. The camp was in a valley of the San Lorenzo mountain range, 5 miles southeast of Valparaiso and about 25 miles from Santa Marta; elevation about 5500 feet. The forest here is very dense and luxuriant, only broken by two small clearings; collections were mainly from rocky mountain sides, 5000 to 6500 feet

19. *Cienega, or La Cienega:* Town on the coast adjoining the great lagoon of the same name; the lagoon belongs to the estuary system of the Magdalena. The country around is flat, swampy in places, and with salt plains; two or three miles back are dry hills with a scrubby growth (dry-forest vegetation). Rio Frio is a town a few miles south of Cienega, on a river of the same name; Gaira, on the Gaira River, is between Cienega and Santa Marta, on low land. These towns are connected by a railroad.

The mammals forming the basis of the present paper number about 1250 specimens and represent 73 species, of which about 30 appear to be forms peculiar to this region, termed 'semi-insular' by Mr. Smith (*cf. antea,* p. 412). The birds also have yielded a high percentage of peculiar forms, as determined by Mr. Outram Bangs and myself.[1]

[1] A report on the birds of this collection was published in Vol. XIII of this Bulletin (August, 1900, pp. 117–183).

As shown by Mr. Smith's list of localities (*antea*, p. 413) the greater part are near the coast at altitudes ranging from sea-level to about 600 feet; a few are between 1000 and 1500 feet, one at 2000, and three at 4500 to 6000 feet; but probably fully two thirds of the specimens were collected below 1000 feet, only a few weeks out of the three years and a half having been spent by Mr. Smith's collectors at altitudes as high as 4500 feet. These were all in the San Lorenzo Mountains, the Sierra Nevada de Santa Marta not being visited. The area, as indicated for me by Mr. Smith on a map of Colombia, is a triangle of which the west side (length about 25 miles) is formed by Magdalena Bay, the north side (length about 30 miles) by the coast of the Caribbean Sea, the other or inland side (length about 40 miles) forming the hypothenuse of the triangle, the whole district probably not exceeding 600 square miles.

While Mr. Smith was preparing for his exploration of the Santa Marta region of Colombia, it happened that the Messrs. A. E. and O. Bangs of Boston had also been attracted to the same region as one of special interest, and, to the surprise of all the parties interested (*cf.* this Bulletin, XIII, p. 118), when Mr. Smith reached Santa Marta, after preparations for financing the trip and gathering the necessary equipment, he found Mr. W. W. Brown already in the field in the interest of the Messrs. Bangs Brothers. As, however, Mr. Brown proceeded soon to the Sierra Nevada de Santa Marta, working at altitudes and in a region for the most part above the district reached by Mr. Smith, there was little duplication of work. Mr. Brown naturally thus obtained a number of species not represented in the Smith material, which, with some others from the coast region, were very promptly made known by Mr. Bangs. In his final paper on the Santa Marta collection of mammals (Proc. New Engl. Zoöl. Club, I, 1900, pp. 87–102) he records 7 species not contained in the Smith collection, while the latter includes 26 species not in the Brown collection. Some of the larger species obtained by Mr. Brown, as *Felis concolor*, *Felis onca*, *Myrmecophaga tridactyla*, etc., are, however, mentioned in Mr. Smith's field notes, and for this reason are included in the present paper.

As already intimated, the material in the present collection has already served, in part or exclusively, as a basis of a number of previously published papers, and in the present connection it has been deemed sufficient merely to cite these earlier papers instead of repeating their substance. I append here an annotated list of these earlier papers, all of which appeared in this 'Bulletin.'

1899. New Rodents from Colombia and Venezuela. *Bull. Am. Mus. Nat. Hist.*, XII, 1899, pp. 195–218. Dec. 20, 1899.

The new species from Santa Marta are: (1) *Lepus (Sylvilagus) superciliaris* (p. 196); (2) *Isothrix rufodorsalis* (p. 197); (3) *Echimys (= Proechimys) mincæ* (p. 198); (4) *Echimys (= Proechimys) canicollis* (p. 200); (5) *Heteromys jesupi* (p. 201); (6) *Akodon columbianus* (p. 203); (7) *Oryzomys maculiventer* (p. 204); (8) *Oryzomys trichurus* (p. 206); (9) *Oryzomys sanctæmartæ* (p. 207); (10) *Oryzomys mollipilosus* (p. 208); (11) *Oryzomys magdalenæ* (p. 209); (12) *Oryzomys villosus* (p. 210); (13) *Sciurus saltuensis bondæ* (p. 213).

1900. List of Bats Collected by Mr. H. H. Smith, in the Santa Marta Region of Colombia, with Descriptions of New Species. *Ibid.*, XIII, pp. 87–94. May 12, 1900.

Twenty-two species. The new species are (1) *Chiroderma jesupi* (p. 88); (2) *Micronycteris hypoleuca* (p. 90); (3) *Promops affinis* (p. 91).

1900. Descriptions of New American Marsupials. *Ibid.*, XIII., pp. 191–199. Oct. 23, 1900.

The new Santa Marta forms are (1) *Didelphis karkinophaga (= marsupialis) colombica* (p. 193); (2) *Metachirus nudicaudatus colombianus* (p. 196).

1904. Mammals from Southern Mexico and Central and South America. *Ibid.*, XX, pp. 29–80. February 29, 1904.

One new Santa Marta form, *Tayra barbara irara* (p. 36).

1904. New Bats from Tropical America, with note on species of *Otopterus*. *Ibid.*, XX, pp. 227–237. June 29, 1904.

A new Santa Marta species is *Molossus bondæ* (p. 228).

1904. New Mammals from Venezuela and Colombia. *Ibid.*, XX, pp. 327–335. Oct. 8, 1904.

The new Santa Marta forms are: (1) *Felis sanctæmartæ* (p. 332); (2) *Procyon proteus* (p. 333).

1904. The Tamandua Anteaters. *Ibid.*, XX, pp. 385–398. Oct. 29, 1904.

A new form from Santa Marta is *Tamandua tetradactyla instabilis* (p. 392).

In addition to the 23 new forms enumerated above, three others will be found described in the present paper, while 10 have been described by Mr. Bangs and 1 by Mr. G. H. Miller, Jr., or 37 in all, out of a total of 86 species recorded from the Santa Marta region. It is probable that still others will require new names, since several of the species of *Oryzomys* recorded by Mr. Bangs from the Sierra Nevada de Santa Marta as identical with Merida or Bogota species can hardly be the same, although perhaps representative of them, since continuous distribution is, to say the least, improbable.

As already said in my report on the birds of this region (this Bulletin, XIII, 1900, p. 122), the fauna of the Santa Marta district (including the high Sierra and low-coast region) presents many peculiar forms, a few of them strongly differentiated from their nearest allies in neighboring regions, others their less modified representatives. This is as would be expected from its topographically isolated position, being, as Mr. Smith has expressed it, "semi-insular" in respect to its physical conditions, and has doubtless been long separated, as regards its mountainous areas, from the Andean ranges to the westward and southward. Also, as already said in another connection, "the home of many 'Colombia' species is to be looked for elsewhere than eastern Colombia," as illustrated by the case of Geoffroy's *Sciurus variabilis*, discussed later in the present paper.

Annotated List.

1. **Marmosa mitis** *Bangs.* — Fifteen specimens, as follows: Bonda, 2 adult males, March and August; 4 females and 6 young, Aug. 8–Sept. 4; Mamatoco, 1 adult female, June 1; Taganga, 1 adult female, June 25; Minca, 1 adult male, June.

"Opossum Rat. — A small grayish-brown species, found in the forest from sea-level to 4000 feet or higher. It is arboreal and strictly nocturnal, passing the day in hollow trees. The females have about eight young, which, when partly grown, are carried on her back, their prehensile tails twining about the mother's tail as she holds it arched over her body. Opossum rats appear to live mainly on insects and birds' eggs; they prowl about on the branches at night. I once caught

one as I was mothing near Valparaiso; the animal was dazzled by my lantern and I easily knocked it into my insect net. Near Mamatoco I found one in a hollow tree which it had entered through a hole ten feet above the ground; it was driven out with difficulty and could not see in the daylight.

"They use the tail to balance and steady their bodies while moving about the slender branches. A common position is transversely across the upper side of a branch, the fore feet close together and the tail passing beneath and over the branch; they seldom or never reach upward with the tail."— H. H. S.

2. **Metachirus nudicaudatus colombianus** *Allen.* — One specimen, adult male, Don Amo, April 20. (See this Bulletin, XIII, 1900, p. 196.)

3. **Caluromys cicur** (*Bangs*). — One specimen, skull only, Minca.

4. **Didelphis marsupialis colombica** (*Allen*). — Twenty specimens, all from the vicinity of Bonda, except one from Valparaiso. (See this Bulletin, XIII, 1900, p. 193; XIV, 1901, pp. 176, 186; XVII, 1902, pp. 260, 276.)

"Opossum. — Common in the dry forest and found in the mountain forest as high as 5000 feet. It is nocturnal, though sometimes moving about during the cool hours of the day. It passes the greater part of the time in trees, occasionally descending to the ground. Opossums seem to be very general feeders, eating insects, young birds, eggs, chickens when they can get them, and sometimes fruits. They make their homes in hollow trees, generally high above the ground. In Colombia the flesh is seldom eaten." — H. H. S.

The Water Opossum (*Chironectes minimus*) was taken at Santa Marta — a single specimen — by Mr. Brown (Bangs, Proc. New Engl. Zoöl. Club, I, 1900, p. 90).

5. **Bradypus tridactylus** *Linn.* — Not represented in the collection sent to the American Museum, but the skull of the specimen referred to below by Mr. Smith has been kindly loaned to me for examination by Mr. W. E. Clyde Todd, Custodian of Mammals and Birds at the Carnegie Museum. Mr. Todd has also kindly sent me a description of the exter-

nal characters (from the mounted specimen), from which and the skull it evidently belongs to the *B. tridactylus* group.

"SLOTH (called *perico lijero* in sarcastic reference to its movements). — Extremely rare near Santa Marta, though sometimes found on the low lands near the river Manzanares; its low cry, said to resemble the wailing of an infant, is occasionally heard at night. Southward, beyond Rio Frio and in swampy forest adjoining the Magdalena flood plains, it is said to be more common; it does not occur in the mountains. Just before leaving Santa Marta we purchased a living specimen which had been brought from Rio Frio; we succeeded in carrying this to Pittsburgh, where it soon died. The skin and skeleton are now in the Carnegie Museum in that city. While living the animal would eat little except mangoes and bananas, which it seemed to like; it spent most of the time clinging to the back of a chair or to slats on its box; on the ground it could move only by stretching out one long fore-leg, hooking an object with its claw, and drawing its body up. Yet sloths sometimes descend to the ground in passing from tree to tree; I once found one between two trees in the forest near Santarem.

"The natural position of a sloth while feeding is either reversed, hanging from a branch by its claws, or clinging to a perpendicular branch with its head upward; in descending it goes backward. Its movements are very leisurely, but by no means as slow as they have been described.

"Sloths are very tenacious of life; I have known one to be literally riddled with seven or eight charges of shot before it loosened its hold and fell." — H. H. S.

6. **Myrmecophaga tridactyla** (*Linn.*). — Not represented by specimens. A single example was obtained at Dibulla by Mr. Brown (Bangs, Proc. N. Engl. Zoöl. Club, I, p. 89). Following are Mr. Smith's notes on its occurrence in the district.

"GREAT ANTEATER. — This animal is extremely rare in the Santa Marta mountains, though occasionally reported; the only one we heard of during our stay was seen by my son and two porters as they were passing on a mountain pass near Valparaiso, at an elevation of about 5000 feet; they had no

firearms, and as none of the party had ever seen the animal before, they hesitated to attack it with sticks; it moved down the mountain side and disappeared in the forest.

"From the notes gathered in Brazil, it appears that the great anteater is essentially a forest animal, though sometimes coming out to the open lands; it eats insects and insect larvæ of many kinds and, I believe, small fruits. The flesh is rarely eaten, and only in case of necessity." — H. H. S.

7. **Tamandua tetradactyla instabilis** *Allen.* — Fifty-seven specimens, all taken at or near Bonda. There are 6 skeletons, the rest being skins and skulls. Only two or three are positively marked for sex, but about half have external measurements, consisting of total length and length of tail. (For measurements and description see this Bulletin, XX, 1904, pp. 386–397.)

"TAMANDUA (called *soro-chuchu*). — Quite common, principally below 2000 feet, in the dry forest. It is very variable in color, but only one species is recognized by the hunters. Like the great anteater, the tamandua is essentially a forest animal, and terrestrial, rarely if ever ascending trees, though its long, hooked claws would seem to fit it well for climbing. It walks slowly and awkwardly on the sides of its feet, and is easily killed by a slight blow on the head. The animal would soon be exterminated if it were much hunted, but the meat is worthless and the skin is but little prized. Tamanduas eat termites, ant larvæ, various other insects, and certain small fruits.

"The little anteater [*Cyclopes didactylus*] is not found in the Santa Marta district; at least, none of our hunters had ever heard of it." — H. H. S.

8. **Tatu novemcinctus** (*Linn.*). — Four specimens, 1 adult and 3 very small young ones, from Bonda (2), Don Amo, and Valparaiso. Adult, total length, 711; tail, 356.

"ARMADILLOES. — A species [*Tatu novemcinctus*] is found, rarely, in the dry forest and in the open land below 2000 feet; and we obtained a single specimen of another [*Cabassous lugubris*] on an open mountain ridge above Valparaiso, at about 5000 feet.

"Armadilloes vary much in their habits and habitat, but

nearly all are found in dry forest or on open land, though wandering into the forest, where, perhaps, some species are residents; they make deep burrows, and, when alarmed, commonly dig into the ground, disappearing rapidly; if the hinder part of the body or the tail is seized before they have quite buried themselves, it is difficult to drag the animal out, so strong is the hold of their hooked claws. They make amusing pets, but are apt to be a nuisance in country houses without floors; they burrow anywhere and make exits under the walls. In captivity the smaller kinds readily eat fruit and rice; in a wild state, all or nearly all the species are partly insectivorous, and some kinds habitually burrow into termite-hills; some eat fruits, and one or two of the larger heavily armored kinds are not averse to carrion.

"The large species are never eaten. Some of the smaller kinds, especially those capable of rolling themselves into balls, are greatly esteemed as food. On the Amazon the Indians roast them in their own shells." — H. H. S.

9. **Cabassous (Ziphila) lugubris** (*Gray*).

Tatoua (*Ziphila*) *lugubris* MILLER, Proc. Biol. Soc. Wash., XIII, Jan. 31, 1899, 6, 8, (Santa Marta).

Cabassous hispidus BANGS, Proc. N. Engl. Zoöl. Club, I, Feb. 23, 1900, 89 (Santa Marta).

Three specimens, carapaces with skeletons, all adult males, — two from Bonda and one from Valparaiso.

The collector's measurements of two of the specimens (Nos. 14862 and 23441, Bonda) are as follows: Total length, 533, 495; tail, 159, 140; ear, 45, 62.

The skulls measure as follows:

	14862 ♂	14863 ♂ ?	23441 ♂
Greatest length	76.5	72	74
Basal length	70	65.5	66.5
Zygomatic breadth	39	39	38.5
Mastoid breadth	37	36	34
Interorbital breadth	24	25	24
Depth of occiput	27	27	26
Length of nasals	25.5	23	24
Palatal length	46	43	43
Length of mandible	56	55	56.5
Upper toothrow	30	28	28
Lower toothrow	25	26	26

Through the kindness of Mr. Witmer Stone, I have been able to compare two of the Cope series of specimens of *Cabassous hispidus*, now in the Museum of the Philadelphia Academy of Natural Sciences, and also an additional skull in this Museum, from Chapada, Matto Grosso, Brazil, with the present series. The Philadelphia Academy specimens are the specimens used by Mr. Gerrit S. Miller, Jr., in the preparation of his paper entitled 'Notes on the Naked-tailed Armadillos' (Proc. Biol. Soc. Wash., XIII, pp. 1–8, figs. 1, 2, Jan. 31, 1899). A critical comparison of this material leads me to accept Mr. Miller's conclusions as against those of Mr. Bangs — namely, that the Santa Marta form is not only specifically but subgenerically separable from *C. hispidus*. Externally the Santa Marta form closely agrees with the Central American *C. centralis* (Miller), but differs greatly in the form of the skull. The differences in the form and number of plates in the head shield, the size and form of the ears, the absence or presence of minute bony plates on the posterior surface of the ears, are among the obvious distinctions between the *C. hispidus* and the *Ziphila* groups, as already made clear by Mr. Miller. The comparatively naked ventral surface and the almost entire absence of bristles at the posterior edges of the plates of the carapace (except on the lower lateral rows) is another feature of contrast between *C. hispidus* and the *Ziphila* group.

It is not, however, so clear that the Santa Marta animal should take the name *lugubris*, the type locality of which is "St. Catherines, Brazils." In the absence of specimens of true *C. lugubris*, however, for comparison, this name is here provisionally accepted, although the presumption is, on geographical grounds, that the Santa Marta animal is different from true *lugubris* from southern Brazil.

The normal dental formula in the *Ziphila* group appears to be $\frac{9}{8} - \frac{9}{8} = \frac{18}{16}$; but in two specimens out of three in *lugubris* there is an extra tooth in the right upper toothrow, as follows:

No. 14862, dental formula, left side, $\frac{9}{8}$; right side, $\frac{10}{8}$.
" 14863, " " " " $\frac{9}{8}$; " " $\frac{10}{8}$.
" 23441, " " " " $\frac{9}{8}$; " " $\frac{9}{8}$

This extra tooth is small, and stands at the front end of the toothrow. In a specimen of *C. hispidus* there is also an extra upper tooth on the right side, but in this case it is a small tooth at the posterior end of the toothrow.

10. **Trichechus manatus** *Linn.* — Although not represented in the collection the following is of interest.

"MANATEE. — Found along the coast, especially about the mouths of the rivers Buritaca and Don Diego, and other rivers further east; when the waters are high they enter these streams to feed on the grass. In August and September, when the sea is generally calm, parties of fishermen go down from Santa Marta and Taganga to fish for manatee; the animals are harpooned from large canoes. In September, 1899, we made a trip to the Buritaca on purpose to get manatee; but the object was frustrated by unusually heavy winds and high seas, making fishing impossible. Several of the animals were seen as they came to the surface, a quarter-mile from the beach. The manatee seems to be purely herbivorous in its diet, eating grass, and perhaps algæ. Its flesh is much esteemed." — H. H. S.

12. **Tagassu torvum** (*Bangs*). — Thirty-five specimens, as follows: 12 skins with skulls; 3 skins with skeletons; 2 skins without skulls; 13 skulls without skins; 4 skeletons without skins. About 20 were taken at Naranja, 6 at Bonda, 3 at Quebra Mojada, and others (mostly without data) at these or neighboring localities. The greater part were taken in January and July; others in March, August, October, and December. They are all adult except two half-grown young. Unfortunately the sex of the specimens is not indicated, nor were external measurements taken, the specimens having been killed and skinned by native hunters.

In describing this species (from a single adult male), Mr. Bangs gave no account of its external characters, beyond saying: "Size smaller than in either *T. tajacu* of southern Brazil or *T. angulatus* of Texas. Color and external characters as in these two species." The present large series, however, on comparison with some thirty or more specimens of the *angulatum* group from Mexico and the southern border

of the United States, shows that the coloration in the two groups is strikingly different. The absence of skins from southern Brazil prevents comparison of the external characters of *torvum* with those of *tajacu*, as now restricted, but below will be found a comparison of their cranial characters.

In general effect the color of *T. torvum* is a grizzle of ochraceous buff, white, and black, the mid-dorsal region being black and white with a tinge of buff, becoming yellowish gray finely varied with black on the sides, and strong yellowish buff on the ventral surface and inner surface of the limbs, slightly punctated with brownish black. Black prevails on the median dorsal area, forming a more or less well defined vertebral black stripe, with part of the bristles wholly black and part black barred with white, the black being most developed on the crown, nape, and shoulders, and more mixed with white posteriorly. The hairs individually, except near the median line, are ringed with alternate bands of black and fulvous white, about two of each to each bristle. The fulvous tint forms merely an indistinct border to the white bars. The tips of the bristles are usually black but a part are tipped with yellowish white. The head, except a median blackish face stripe, is usually much more strongly suffused with yellowish buff than the body, particularly on the sides of the face and between the eyes and the base of the ears, this strong buffiness or rusty yellow cast of the head, in contrast with the middle region of the back, being a conspicuous feature of the species as compared with any of its northern allies. The strongly marked ochraceous buff collar is another prominent and very constant feature, formed by the two shoulder bands, which begin on the throat and extend posteriorly and upward, nearly meeting over the shoulders. Feet and anterior surface of limbs blackish brown; chin blackish, and a median blackish band on the face.

Unfortunately, as already stated above, there are practically no external measurements, the specimens having been taken by native hunters and skinned without being measured or any record being made of the sex. The total length is given for two adults as, respectively, 914 and 927 mm.

Taking the skulls as a basis for comparison, *T. torvum* and *T. tajacu* do not differ appreciably in size, as shown by the subjoined tables of measurements, but they are readily separable on other cranial characters, notably by the difference in the facial angle, through the greater depth of the occipital portion of the skull. With the total length and zygomatic breadth absolutely the same (in the average) in both, the depth of the occiput (top of the occipital crest on the median line to lower border of occiput) in *T. tajacu* is 80 mm. and in *T. torvum* 74.5 mm. This gives, approximately, a facial angle of 55° for *tajacu* and a facial angle of 64° for *torvum*. In addition to this, the audital bullæ are slightly larger and the dentition is appreciably weaker in *tajacu* than in *torvum*, as shown in the subjoined tables. On the other hand, *T. torvum* is much like the northern forms of the genus (*angulatum* and allies), but the skull is very much smaller, and, as already shown, the coloration is distinctly different.

The type locality of *T. tajacu* being Paraguay, the Chapada (Matto Grosso, Brazil) series of skulls here used as representing that species is presumably typical, Chapada being close to the northern border of Paraguay. They were collected by Mr. Herbert H. Smith in 1885. All the skulls in both tables are fully adult, but the teeth in some of the Chapada specimens are a little more worn than they are in any of the specimens of the Santa Marta series. None of them has the sex indicated.

One of the specimens of the Chapada series (No. 326) presents an interesting dental abnormality, namely, a supernumerary molar on the right side of the palate, situated opposite the junction of m^2 and m^3, wholly internal to the toothline. It has the crown structure of p^1, but is larger, about equalling p^2.

MEASUREMENTS [1] OF 8 SKULLS OF *Tagassu torvum*, FROM SANTA MARTA, COLOMBIA.

Mus. No.	Total length.	Basal length.	Zygom. breadth.	Postorb. breadth.	Depth of occiput.	Upper toothrow.	M².	Rostrum.	Middle upper incisors.	Bulla.
14676	228	193	99	74	73	65	13. X 13.	25	17.5	25 X 23
14677	239	201	102	75	78	68	13.3 X 13	27.5	20	26.6 X 23
14679	206	175	97	69	72.5	63	13.5 X 12.3	25.5	18	21 X 22.
14681	223	184	—	67	75	65.5	14 X 12	26	18	20.5 X 20
14875	224	186	93	63	74	69	13.5 X 13	26	19	20 X 19
23527	236	197	101	78.5	76.5	66	13.3 X 14	28	19	22 X 23
23529	231.5	195	96	73	76	65.5	13 X 12.3	26.3	19	23 X 22
23532	220	183	102	73	71	66.2	14 X 13	25	17	23 X 20
Average...	226	189	98.7	71.6	74.5	66.3	13.5 X 12.6	26	18.4	22.6 X 21.

MEASUREMENTS [1] OF 10 SKULLS OF *Tagassu tajacu*, FROM CHAPADA, BRAZIL.

Mus. No.	Total length.	Basal length.	Zygom. breadth.	Postorb. breadth.	Depth of occiput.	Upper toothrow.	M².	Rostrum.	Middle upper incisors.	Bulla.
322	231	190	101	70.5	85	65	14 X 11.5	26.5	18.5	23 X 22
323	233	188	98	72	73	60	12 X 11	26	16.6	24 X 21
324	230	187.5	98	72	80	62.3	12.5 X 11.5	27.5	19.6	24 X 20
325	220	189.5	98	66	76	58	11 X 11.3	24	18	24 X 20
326	218	177	96.5	67.5	81	61	12 X 11	27	17.3	22 X 20
327	226	186.5	93	64	78.3	63.5	13.5 X 13	25.5	18	24 X 22
328	222	182	96	72	81	56	10.5 X 11	26.5	16.5	22 X 21
329	223	183	100	71	84	59	12 X 12	26.3	17.5	23.5 X 22
330	233	197	104	70.5	83	65	13 X 12	26	19	22 X 23
386	227	188.5	104	74	81	64	13 X 13	27	19	24 X 21
Average	226	187	98.8	70	80	62.4	12.4 X 11.7	26	18	23.3 X 21

[1] *Explanation of Measurements.*

Total length = front edge of premaxillaries to edge of occipital crest.
Basal length = inner base of incisors on the midline to posterior border of condyles.
Zygomatic breadth = at most expanded part of zygomatic arch.
Postorbital processes = between extreme external points.
Depth of occiput = top of occipital crest on median line to lower posterior border of basiocciptal.
Rostrum = width in front of canines.
M^2 = length of crown on median line x greatest breadth of tooth.
Middle upper incisors = transverse breadth of alveolarline.
Bulla = greatest length x greatest width

13. **Tagassu (Olidosus) pecari** (*Fisher*). — Twenty-six specimens, as follows: skins with skulls, 15; skin with skeleton, 1; skins without skulls, 8; skeletons without skins, 2; skulls without skins, 6. Three were taken at Calavasa, the others at Naranja; 7 were collected in January, 4 in March, 3 in July, 3 in August, 2 in October, 1 in December, and 5 are without date.

All are adult except 5; these include four young a few days old and one young about one fourth grown. Only three have the sex indicated, and two only have external measurements, as follows:

Females, Nos. 14871 and 14872, total length, for each, "3 ft. 7 in." (992 mm.).

MEASUREMENTS [1] OF 9 SKULLS OF *Tagassu pecari* FROM SANTA MARTA, COLOMBIA.

Mus. No.	Sex.	Total length.	Basal length.	Zygom. breadth.	Postorb. breadth.	Depth of occiput.	Upper toothrow.	M^2.	Rostrum.	Middle upper incisors.
15464		268	230	112.5	87	89	78	15 x 13	37.5	20.
14874	♀	270	230	116	96	98	78.5	17 x 14	37.5	23
14684		274	235	117	90	97.5	77	15.5 x 14	38	22
14686		259	225	111	87	91	75	16 x 14.6	36	22
14872	♀	267	223	104	87	92	73	15 x 13.5	36.5	22
14688		267	234	115	91	91	75	15 x 13.3	37.5	21
14683		252	214	109	88.5	86	74.5	16 x 13	36	23
15465	♂	268	228	110	87.5	90	90	16 x 14	35.5	22
14687		267	225	105	85	88	74.5	15 x 13	35	21
Average....		260	227	111	88.7	91	77	15.6 x 13.6	36.6	21.8

In the absence of specimens of *Olidosus* from other localities no comparison can be made between the present and allied forms.

The adults of the present series are black, more or less varied with rufous, the amount of rufous varying in different specimens. On the body the hairs are mainly wholly black, mixed with others ringed or tipped with rufous; on the sides of the head the rufous is generally a conspicuous feature of

[1] For explanation of measurements see p. 426. Measurements of the audital bulla are omitted, since the length cannot be given, the posterior part of the bulla being concealed by the overlying exoccipital.

the coloration, and is more or less prominent on the neck and shoulders. The nose, chin, and throat are soiled whitish, the white extending back as a broad band along the sides of the mouth and on the sides of the neck as far as the ear.

The newly-born young are rufous, with a median dorsal black stripe, from the occiput to the hips. The rufous of the head and body is more or less varied with black, the individual hairs being in part wholly rufous and in part rufous ringed or tipped with black. The nose, chin, and sides of the face are uniform rufous, like the body, showing none of the whitish tint that has given to the adults the name White-lipped Peccary. The rufous of the young in first pelage is gradually replaced when the animal is about one fourth grown by the black pelage of the adult.

One of the most striking peculiarities of the subgenus *Olidosus* appears hitherto to have escaped notice, namely, the form and position of the audital bulla. In the subgenus *Tagassu* the bulla is fully exposed posteriorly, and is subtriangular in outline, with a sharply convex antero-internal angle, a slightly convex internal border, a short obliquely truncated outer angle, and a broad oblique posterior face, abruptly prolonged internally to form a swollen projection, leaving a deeply concave surface on the posterior plane. In *Olidosus* the posterior conical projection is greatly produced, and the postero-external third (nearly one half in old specimens) is covered and concealed by the downward projection of the exoccipital, producing a very different outline for the exposed portion of the bulla, which is greatly more extended posteriorly.

"Wild Hogs. — The two species distinguished here as *puerco* [*Tagassu pecari*] and *saina* [*Tagassu torvus*] are both common, especially in the dry forest near the coast; they range certainly to 4000 feet, and probably higher. Puercos go singly or (usually) in pairs, or the sow with her pigs; the sainas commonly go in bands of four to ten. Both are eaten, but the meat is unpleasant unless the scent gland is cut out immediately after death. They are commonly hunted with dogs and are often dangerous game, especially the sainas when the bands are large. They wander both by day and night,

often seeking streams and pools where they can wallow. Their food consists largely of forest fruits, but they are as omnivorous as domestic swine, eating roots, grubs, fish thrown up on the beach, and so on.

"The saina sows have four, six, or more pigs in a litter; the puercos seldom more than three or four. We tried vainly to rear the young; they were readily tamed, but soon died, no doubt because of the changed diet.

"Both the saina and puerco are much infested with the larva of a fly (Œstridæ, called *gusano* here) which burrows under the skin and causes running sores. These larvæ also attack monkeys, dogs, and other animals, as well as man." —H. H. S.

14. **Mazama memorivaga** *F. Cuvier.* — Twenty-one specimens (skins and skulls), and several additional skeletons, as follows: 6 adult males, 12 adult females, 2 half-grown females, and 1 fawn in spotted coat; all taken in the immediate vicinity of Bonda, as follows: Jan. 12 and 13, Feb. 10, March 5, 23, and 28, April 21, June 21 and 22, July 6, Oct. 12 and 13, and Dec. 20. Only six have external measurements, and these give only the total length, the length of the tail, and the girth of the chest and neck. While girth measurements are useful to the taxidermist as an aid in mounting specimens, they are hardly citable in the present connection.

The total length for 3 males is given as: 1118, 1146, 1154; length of tail for the two last, 86, 89. The measurements given for a single female are: Total length, 1168; tail, 127.

Five adult male skulls and 7 adult female skulls measure as follows:

14643,	♂,	gr. length,	185;	gr. breadth,[1]	82;	up. toothrow,	57;	antler,	95.
14640,	♂,	" "	184;	" "	81;	" "	60;	"	109.
14685,	♂,	" "	182;	" "	83;	" "	57;	"	83.
14645,	♂,[2]	" "	180;	" "	81;	" "	55;	"	58.
24378,	♂,	" "	178;	" "	85;	" "	55;	"	113.
14642,	♀,	" "	186;	" "	81;	" "	58.		
15486,	♀,	" "	179;	" "	80;	" "	58.		
14864,	♀,	" "	178;	" "	78;	" "	55·5.		
14646,	♀,	" "	175;	" "	75;	" "	53·5.		
14638,	♀,	" "	174;	" "	80;	" "	56.		
23476,	♀,	" "	179;	" "	75;	" "	57.		
23479,	♀,	" "	179;	" "	81;	" "	56.		

[1] At lower edge of orbits; the zygomatic breadth is 2 to 4 mm. less.
[2] The oldest and also the smallest of the series of males.

The tarsal gland and tuft are present in all the specimens of this series, but they are much smaller than in *M. rufa*, the erect stiff hairs of the tuft proper covering an area of about 12 by 16 mm.; the hairs are very stiff and short, dark brown, with often a small central whitish spot. In *M. rufa* the area covered by the tuft is very much larger — about 25 by 25 — and the hairs are softer, longer, and light yellowish brown.

The present series, although consisting of specimens taken in nearly every month of the year, shows little color variation that can be attributed to season. February, June, and October specimens differ very little in coloration, or in the fulness or length of the pelage. There is, however, considerable individual variation, two specimens (one taken April 21 and the other Oct. 12), being much lighter colored than the others. These have the general color yellowish rufous, the yellowish tips of the hairs being much longer and brighter yellow than usual. The cap of long hairs on the head is in some specimens dark brown, in others dark yellowish rufous.

"This species ranges from sea-level to 4000 or 5000 feet, living properly in the forest, but coming out to graze on the open lands at night. It is not very common in the district explored. These deer are not gregarious, but go singly or in pairs, or the female with her fawn. They are rather nocturnal than diurnal, though they see well enough during the day in the forest shades." — H. H. S.

15. **Tapirus terrestris** (*Linn.*). — Three specimens, two adults, with skeletons, and one in the immature spotted dress, Cacagualito.

"The tapir is common from the sea-coast to 6000 feet, and probably higher, as I have seen tapir tracks at nearly 8000 feet. They go singly or in pairs or families, wandering both during the day and at night, and often seeking streams, where they love to bathe themselves in the cool water; they are said to swim well. The food consists of leaves, young twigs, grass, and fruits. They are properly forest animals, rarely coming out to the open lands at night. In passing through thickets they make their way by sheer strength, breaking or bending the branches; and they can often be tracked by the

noise made; though such heavy animals they can run rapidly even where the growth is tangled. Tapirs see badly, at least during the day, but they are very keen-scented.

"The female tapir has, generally at least, only one young at a birth. The animals are much hunted for their meat, which is excellent, much like beef. In southern Brazil and Argentina the hide is greatly prized for lariats, halters, and other works requiring great strength; it is thick, white, and very strong, and competent judges pronounce it almost equal to hippopotamus hide. In Colombia little use is made of it. As tapirs are easily domesticated, and will feed about a house like swine, it would probably pay well to breed them.

"All the hunters near Santa Marta aver that there is a tapir, found in the mountain forest, which, in general color, resembles *T. americanus*, but has a broad white mark over the shoulders. This information was given without any leading questions, and the hunters knew nothing about the Malay tapir, which by their description this one resembles. . . . I can hardly refuse to believe these reiterated and sober statements, made by my men who had no motive for inventing the story, and who would be incapable of inventing a new species so much like the eastern form. I offered a large reward for a specimen, but failed to obtain one, and can only give the story as I heard it. It seems probable that this region has an undescribed tapir, which differs in color from all the known American species, and resembles that of the Malay Islands." — H. H. S.

16. **Sciurus saltuensis** (*Bangs*).

Sciurus variabilis saltuensis BANGS, Proc. Biol. Soc. Washington, XI, 1898, 185. Nov. 16, 1898. Pueblo Viejo, Colombia (alt. 8000 ft.)

Six specimens: Valparaiso, 4, May 24–31 and June 13; Sierra El Libano, 1, May 24; Don Diego, 1, May 8. Four of these are very dark, quite unlike the coast form (*S. saltuensis bondæ*), and seem to typically represent the mountain form named *saltuensis* by Mr. Bangs. The fifth specimen is quite like examples in corresponding pelage from the coast region.

"Common, ranging from sea-level to 6000 feet or higher.

As shown by Dr. Allen [this Bulletin, XII, 1899, pp. 214–216], the color of the upper parts varies from red, more or less bright, to dark olivaceous; he considers the former a breeding and the latter a summer or post-breeding pelage. My strong impression, however, is that the depth of coloring is connected in some way with the habitat. We observed that specimens shot near sea-level [*Sciurus saltuensis bondæ*] were generally red, no matter in what month they were found; while those from the mountains [*Sciurus saltuensis*] were commonly dark at all seasons; the rule, however, is not invariable, as we have some dark ones from near the coast and a few bright red ones from the higher mountains. At Minca (2000 feet) the two varieties were about equally common in May. It may be well to note that our first collections were from Bonda, and nearly all the squirrels were red; as dark ones were brought in we noted the difference and always saved such specimens if we could, while often rejecting the red ones. Consequently the collection does not give a correct idea of their relative abundance." — H. H. S.

17. **Sciurus saltuensis bondæ** *Allen.* — Sixty specimens, including large series of adults of both sexes, and a number of young specimens of various ages, all collected at Bonda except two, taken at Minca. More than half were collected in July, and most of the others late in June or early in August, the months from November to May being represented by only from 1 to 3 specimens each. Many of the specimens are in moult, and the gradual change of pelage can readily be traced.

This squirrel, like many others, is subject to a wide range of seasonal variation in color. In all specimens the ventral surface is pure white, the white extending forward to the posterior border of the throat, and down the inside of the limbs as a narrow band — on the fore limbs ending about half way between elbow and wrist; on the hind limbs, about half way between knee and heel. The rest of the pelage varies from intense bright rufous to olivaceous, except the tail, which is always deep red, the basal portion excepted, which latter varies in color with the season, like the rest of the dorsal pelage. The brilliant rufous phase is evidently the

'winter' or breeding pelage, in which the hairs are long, shining intense uniform rufous, without annulations of black, shown in perfection by only about one specimen in ten of the present series. The olivaceous phase is the opposite extreme, the post-breeding pelage, shown in perfection by still fewer examples. In this pelage the whole dorsal area, including the head, flanks, feet, and the basal inch and a half to two inches of the tail,— all of the body pelage except the fulvous chin and throat and the white of the belly and inside of the limbs and the apical three-fourths to four-fifths of the tail,— is olivaceous, the hairs individually being dark plumbeous for the basal third, then fulvous narrowly ringed subapically with black, giving an olivaceous general effect. The change, as usual, begins on the feet, soon involving the inside of the fore arms and inside of the thighs, and later the whole of the fore limbs and outside of the shoulders; simultaneously there is also developed a bright rufous lateral line; the new pelage now rapidly advances up the sides of the chest and shoulders, meeting on the median line and then extending forward over the head and backward to the base of the tail, the rump, basal portion of the tail, and the top of the head being the parts last to acquire the brilliant rufous of the breeding pelage. The greater part of the specimens of the present series (taken at various dates from June 20 to August 3, but nearly all in July) are in various stages of the change, often showing a clear and unmistakable line of demarkation between the two pelages. The most olivaceous specimen of the series was taken March 12; the most intensely and uniformly rufous specimens were taken July 4, 6, and 29. The seasonal change in color, through moult, is perfectly parallel to that in the North American *Sciurus hudsonicus* group.

There is evidently considerable individual variation, and it seems probable that many specimens never reach the complete intense stage of rufous, but have the hairs of the head, lower back, rump, and the base of the tail red, subapically ringed narrowly with black, the black annulations being more or less visible as a part of the surface color. The tail hairs are generally uniform deep red from tip to base, but in quite

a number of specimens many of them show a distinct band of black, more especially on the apical third of the tail, where there is sometimes developed a rather prominent narrow zone of black, distinctly visible on the lower side of the tail without parting the hairs. There is much reason to suppose, however, that the presence or absence of black in the tail is a seasonal feature, and that the wholly red tails go with the red body pelage and the mixed black and red tails with the olivaceous post-breeding dress.

The first pelage of the young is of the olivaceous annulated type, with, however, the general effect more rufous, and the tail hairs wholly red. Most of the young (about quarter-grown) specimens were taken the last of June and during the first week of July, but one is labelled Nov. 18, showing that the season of reproduction, and also of moult, is subject to much individual variation. (For measurements, and further remarks on seasonal changes and individual variation, — here somewhat modified by more detailed study of a greater amount of material, — see the original description of the subspecies, this Bulletin, XII, 1899, pp. 213–217.)

Mr. Bangs (Proc. Biol. Soc. Wash., XII, 1898, p. 183; Proc. New Eng. Zoöl. Club, I, 1900, p. 91) has considered the squirrels "from the lowlands of the Colombian coast as strictly typical *Sciurus variabilis*," a conclusion to which I have already taken exception (this Bulletin, XII, 1899, p. 216). At the time we both wrote it was presumed that the type region of this species was Colombia, on the principle of exclusion; but Mr. Bangs assumed the Santa Marta region to be the type locality, while the non-agreement of Geoffroy's description and colored figure with the Santa Marta series led me to believe that the real type locality of *S. variabilis* must have been somewhere in the western part of Colombia. On going over the subject again I still find it impossible to make Geoffroy's description and figure fit the Santa Marta animal. His figure shows a squirrel with the posterior fourth of the dorsal surface deep rufous, in strong contrast with the more anterior part of the dorsal region, and the basal two-thirds of the tail mainly black, a condition in both

respects entirely at variance with any of the phases of the Santa Marta squirrel. His description applies in a general way very well to some phases of the body pelage of this animal. But his account of the tail, the hairs of which, he says, are always black at their origin and red at their extremity, and that the tail, owing to the distichous arrangement of the hairs, is much blacker on the posterior face than on the anterior,[1] is entirely opposed to anything seen in the Santa Marta animal. Besides, there is evidence that M. Plée's journey in Colombia was up the Magdalena River. Schlegel says, in his 'Simiæ' (Mus. Pays Bas, VII, p. 184), under *Ateles hybridus*: "On sait, par les observations du voyageur Roulin . . . que ce singe est très commun dans la vallée du fleuve Madelaine en Colombie. Les individus du Musée de Paris proviennent, à l' exception d'un seul, du voyage de Plée. Un des notres a également été recueilli par ce voyageur." And in his list of specimens of this species he says: "1. Femelle à l'âge moyen, voyage de Plée, Colombie, acquise en 1834 du Musée de Paris." It is probable — perhaps almost certain — that the squirrels, collected by M. Plée, on which Geoffroy founded his *Sciurus variabilis*, came also from the Magdalena River in Central Colombia, — a very different region zoölogically from the Santa Marta coast district, and hence the squirrel named *variabilis* would naturally differ from the Santa Marta form. Indeed, it seems now safe to assume that the real type locality of *S. variabilis* is the Magdalena River of Colombia, at some point quite remote from the coast, in the region inhabited by *Ateles hybridus*, which we know is not found in the Santa Marta region.

18. **Mus alexandrinus** *Geoffroy*. — Five specimens, Onaca, Sept. 2, and El Libano (alt. 6500 feet), June 29 and July 1. Three out of the five specimens are more or less mixed with the *Mus rattus* stock, only one being a normal *M. alexandrinus*.

19. **Mus musculus** *Linn.* — Three specimens, Taguaga,

[1] "La même remarque est applicable aux longs poils de la queue toujours noirs à leur origine et roux à leur extrémité. Mais il résulte de la disposition distique de la queue qu' elle est toujours beaucoup plus noire à la face postérieure qu'à l'antérieure." — *Is. Geoffroy*, Mag. de Zool., 1832, Classe I, pl. 4, 5, 6, [p. 3].

June 23 and 24. These are rather more fulvous, both above and below, than average specimens from the United States.

"HOUSE RATS. — Apparently the only common species is the roof rat; this is abundant in all the settlements and is sure to invade new clearings soon after they are started; it was often trapped in old clearings half a mile or more from houses. The only other species we heard of is the house mouse which occurs at Santa Marta, but it is not abundant."—H. H. S.

20. **Oryzomys maculiventer** *Allen.* — Fifty-two specimens, skins and skulls, and 10 skeletons and skulls, mainly from El Libano and Valparaiso. (See this Bulletin, XII, 1899, p. 204.)

Since this species was first described I have had the opportunity to make direct comparison of a series of specimens of it with *O. meridensis* Thomas, to which *O. maculiventer* has been referred by Mr. Bangs, and find no difficulty in distinguishing the two forms. Though closely allied, they are easily separable.

"This is the commonest species in the San Lorenzo Mountains, from about 4000 to 6000 feet. We found their holes commonly in rocky places, in crevices of the stone; sometimes under stumps or logs." — H. H. S.

21. **Oryzomys illectus** (*Bangs*). One specimen, adult, Don Diego, May 9.

This species was considered by Mr. Bangs to be a subspecies of *O. flavicans* Thomas, from Merida, Venezuela. With a large series of topotypes of *O. flavicans* before me, I have no hesitation in considering the two forms as specifically distinct, especially as it is highly improbable that their ranges can be continuous.

22. **Oryzomys (Zygodontomys) sanctæmartæ** *Allen.*—Eight specimens, Mamatoca, and vicinity. (See this Bulletin, XII, 1899, p. 207).

23. **Oryzomys magdalenæ** *Allen.* — Two specimens, Minca and Valparaiso. (See this Bulletin, XII, 1899, p. 209.)

24. **Oryzomys villosus** *Allen.* — Two specimens, Valparaiso and Don Diego. (See this Bulletin, XII, 1899, p. 210.)

25. **Oryzomys mollipilosus** *Allen.* — Eleven specimens, of which only 5 are adult, collected as follows: Valparaiso, 6, of which 3 are adult; Don Diego, 4, of which only 1 is adult; Minca, 1. (See this Bulletin, XII, 1899, p. 208.)

Mr. Bangs gives *O. laticeps* (Lund) as occurring abundantly at 8000 feet in the Santa Marta Mountains. The three preceding species (*O. magdalenæ*, *O. villosus*, and *O. mollipilosus*) have been compared with authentic specimens of *O. laticeps* in the British Museum, and all prove to be decidedly different from *O. laticeps*. While closely related *inter se*, they are readily distinguishable by the characters already given.

26. **Oryzomys trichurus** *Allen.* — Five specimens, 3 adults and two young, from Bonda and immediate vicinity. (See this Bulletin, XII, 1899, p. 206.) The tail varies greatly in amount of hairiness, in two specimens the tail being scantily clothed, and in the third (the type) heavily clothed. Possibly more than one species is represented by these specimens.

27. **Oryzomys (Melanomys) columbianus** (*Allen*). — Seven specimens; 6 from Manzanares and 1 from Minca. (See this Bulletin, XII, 1899, p. 203.)

A reëxamination of these specimens shows that the original reference of this species to *Akodon* was erroneous. While Akodont in many features, it is better referred to *Oryzomys*, as a member of Thomas's subgenus *Melanomys*, proposed for *O. phæopus* and its near allies.

Mr. Bangs reports *Rhipidomys venezuelæ* Thomas from the Santa Marta Mountains, but there is no representative of this genus among the Muridæ of the Smith Collection. My *O. trichurus* is not a *Rhipidomys*, as suggested by Mr. Bangs (Proc. N. Engl. Zoöl. Club, I, 1900, p. 94).

28. **Sigmodon sanctæmartæ** *Bangs.* — Ninety specimens, skins and skulls, and 7 additional skeletons, of which about one half were collected at Minca, at altitudes varying from 100 to 2000 feet, and the rest at Bonda, Onaca, and neighboring localities at altitudes varying from 100 to 500 feet.

In coloration and general external appearance, *S. sanctæmartæ* greatly resembles *S. borucæ* from Costa Rica, and *S. bogotensis* from Bogota, Colombia; nor is there apparently

very much difference in size or proportions, as shown by the following measurements of 38 adults (the females all show marks of having suckled young) from the Santa Marta district.

			Total length.	Tail vert.	Hind foot.
Bonda and Onaca,	7 spec.	♂	280(254–302)	122 (113–130)	34 (30–38)
" " "	3 "	♀	283(264–298)	118 (111–127)	32.3(30–35)
Masinga Vieja,	7 "	♂	303(275–320)	127 (122–145)	35 (33–37)
" "	4 "	♀	294(270–305)	127.5(123–130)	34.7(33–36)
Minca,	8 "	♂	276(260–303)	122 (113–132)	31 (29–35)
"	9 "	♀	265(254–291)	116 (103–120)	31.5(29–35)
S. borucæ,	Type	♀	275	115	32
S. bogotensis,[1]	8 spec.		275	100	33

The pelage in *S. borucæ* is much softer and less hispid than in the Santa Marta form, and the general color is less ferruginous. These features are much more strongly evident in the young in first pelage than in the adults, the contrast in color between the young examples in the two series being very marked; the young of *S. borucæ* are rusty brown while the others are much darker, having only a slight fulvous wash in place of the strong rusty wash in *S. borucæ*. The ear is also very much larger in the Santa Marta form than in *S. borucæ*, and less heavily clothed.

[Since the manuscript of this paper was sent to the printer Mr. Outram Bangs, Curator of Mammals at the Museum of Comparative Zoölogy, Cambridge, Mass., has generously sent me, in response to my request for certain specimens, nearly all of the Santa Marta Muridæ (only the genera *Sigmodon* and *Mus* being omitted) collected by Mr. W. W. Brown for collation with the Muridæ of the Smith collection, with the request that I should describe any species that might prove new. It is needless to say that such courtesy is greatly appreciated; and the following is submitted as a supplement to the foregoing enumeration of the Muridæ of the Smith collection.

Of the 9 species of indigenous Muridæ recorded by Mr. Bangs as collected by Mr. Brown, 5 are represented in the Smith collection, the other 4 being apparently not found in the region explored by Mr. Smith's collectors. On the other hand the Smith collection contains 4 not obtained by Mr. Brown, making a total of 13 species of Muridæ thus far recognized from the Santa Marta region. The following is a collation of the two collections.

[1] Measurements approximate, from skins.

Rhipidomys venezuelæ Bangs (Proc. New Engl. Zoöl. Club, I, 1900, p. 92). — Not represented in the Smith collection. The 9 specimens sent for examination were taken in the Sierra Nevada at altitudes of 3000 to 8000 feet. On comparison of this series with eleven topotypes of true *R. venezuelæ* from the mountains of Merida (altitude about 4500 feet), the two series are distinguishable at a glance, the Sierra Nevada specimens being much redder than the Merida series, including the immature specimens as well as the adults. The general color above, instead of being dull grayish fulvous as in *R. venezuelæ*, is reddish brown, varying in different specimens from fulvous to rufous. Individual specimens from the two series can be very closely matched, but the two series when compared collectively are decidedly different. A comparison of the collectors' measurements shows very little difference in size, nor is there any appreciable difference in cranial characters.

Oryzomys meridensis Bangs (*l. c.*, p. 92). — This, as Mr. Bangs supposed, is my *O. maculiventer*, which, while a member of the *meridensis* group, proves to be satisfactorily distinct on comparison of topotypes of the two forms, as noted above.

Oryzomys laticeps Bangs (*l. c.*, p. 93). — Of the 13 specimens sent for examination 12 are from Pueblo Viejo (alt. 8000 ft.) and 1 from Palomino (alt. 5000 ft.). This is my *O. mollipilosus* from Valparaiso (alt. 4500 ft.) in the San Lorenzo Mountains. The younger specimens are practically indistinguishable from the original specimens (young adults) of *O. mollipilosus*, but the old specimens, with much worn teeth, are larger and paler with coarser pelage.

A careful study of Mr. Bangs's fine series leads me to question the distinctness of my *O. magdalenæ* from *O. mollipilosus*. My *O. villosus*, also from Valparaiso, is, however, very distinct from *O. mollipilosus*, being easily distinguishable by its large, naked ears, and strongly marked cranial characters.

Oryzomys flavicans illectus Bangs (*l. c.*, p. 94). — As noted above, this is quite different from true *O. flavicans* Thomas, from Merida, and should stand as *O. illectus* Bangs. The series of 8 specimens sent me by Mr. Bangs, nearly all from Pueblo Viejo (alt. 8000 ft.), is strikingly different from a series of 20 topotypes of true *O. flavicans;* no specimens in the two series can be found that approach each other very closely, especially in the color of the underparts. The coloration of *illectus* is very much deeper throughout, being very much more rufous above, and orange buff below instead of nearly clear white. It is also much larger. The differences in coloration are parallel to those between *Rhipidomys venezuelæ* of Merida and the Sierra Nevada, but very much greater. A comparison of the skulls of *O. flavicans* and *O. illectus* shows that the two forms are by no means closely related, *O. illectus*

having much shorter and smaller palatine foramina, larger bullæ, broader postpalatal fossa, etc., than *flavicans*.

As noted above, there is only a single specimen of this species in the Smith collection, taken at Don Diego in the San Lorenzo Mountains. My *O. trichurus*, from the coast at Bonda, which Mr. Bangs (*l.c.*, p. 94) considers to be probably a compound of *R. venezuelæ* and his *O. flavicans illectus*, is not only not a *Rhipidomys*, but has no close — only a congeneric — relationship to *O. illectus*.

Oryzomys (*Oligoryzomys*) *navus* Bangs (*l. c.*, p. 95). — Not represented in the Smith collection.

Oryzomys (*Oligoryzomys*) *dryas humilior* Bangs (*l. c.*, p. 95). — Not represented in the Smith collection.

Oryzomys (*Zygodontomys*) *phæopus obscurior* Bangs (*l. c.*, p. 95.) — This is my "*Akodon*" *columbianus* (see above, p. 437).

Oryzomys (*Erioryzomys*) *monochromos* Bangs (*l. c.*, p. 97). — Not represented in the Smith collection.]

29. **Heteromys jesupi** *Allen*. — Twenty-two specimens, from seven localities ranging in elevation from sea-level to about 2000 feet. (See this Bulletin, XII, 1899, p. 201.)

30. **Proechimys mincæ** (*Allen*). — One hundred and twenty-five specimens, skins and skulls, and 14 additional skeletons and several skulls, about two thirds of which were taken at Minca and the rest at or near Bonda. They include a large number of adults of both sexes and young of all stages of immaturity. There is, however, little to add to the account of the species already given. (See this Bulletin, XII, 1899, p. 198.)

31. **Proechimys canicollis** (*Allen*). — Ninety specimens, skins and skulls, and several additional skeletons and skulls, of which about one half are from Bonda and the rest from Santa Marta and nearby localities. (See this Bulletin, XII, 1899, p. 200.)

"*Proechimys mincæ* and *P. canicollis*. — The latter is the commonest rat below 1000 feet; the former takes its place in open lands, dry forests and thickets from about 1000 to about 2500 feet; but it does not extend far into the true mountain forest. Some *mincæ* are found nearly to sea-level, and *canicollis* occurs, rarely, to 2000 feet. Both live in holes in the ground, commonly in shady places and not far from streams. The proportion of tailless individuals is greater than Dr.

Allen has indicated, as we rejected a large proportion of them. I should say that one half of the adults taken had lost their tails, wholly or in part. In two or three cases we found the flesh and bones of the tail separated, so that it hung by the skin." — H. H. S.

32. **Isothrix rufodorsalis** *Allen.* — One specimen, adult male, Onaca. (See this Bulletin, XII, 1899, p. 197.)

33. **Coendou sanctæmartæ,** sp. nov.

Type, No. 15460, ♀ ad., Bonda, Santa Marta district, Colombia, April 28, 1899; coll. Herbert H. Smith.

Type: General color above dark brownish black, punctated with white. The quills for their basal fourth or third are white, then blackish or brownish black tipped with clear white, the length of the white tip varying according to the region of the body, averaging about 5 mm. over the greater part of the back and sides, but increasing in length on the top of the head, nape, shoulders, lower back, and basal half of the tail to about 10 mm., a few reaching 13 to 15 mm. Belly and limbs grayish brown, the pelage on these parts consisting of slender spines mixed with spiny hairs, the latter with fine hair-like tips. The pelage of the back consists almost wholly of spines, without any intermixture of hairs.

Two other specimens agree essentially with the type, except that in one the light tips of the spines of the anterior part of the back have the white replaced by pale chestnut; a fourth shows a similar variation in the color of the tips of the dorsal spines, and in addition has a slight intermixture of brownish woolly hairs among the spines over the posterior part of the back.

Represented by 5 specimens—four skins and skeletons and one additional skeleton—all taken in the immediate vicinity of Bonda, April 15 and 28, and June 10 and 14. Two are males and 3 are females, all adult. As shown by the following measurements, the males are considerably larger than the females.

External Measurements.

15459,	♂,	total length,	941;	tail,	433;	hind foot,	95.
23471,	♂,	"	"	941;	"	476;	"	"	—
15460,[1]	♀,	"	"	787;	"	433;	"	"	89.
23472,	♀,	"	"	737;	"	344;	"	"	89.
23473,	♀,	"	"	750;	"	—;	"	"	83.

[1] Type.

Cranial Measurements.

	15459 ♂	23471 ♂	15460[1] ♀	23473 ♀	23472 ♀
Total length	89	85	82	79.5	84
Basilar length	78	74	70	65	67
Zygomatic breadth	49	50	50	46	—
Nasals, length	30	30	29.5	25.5	30
" breadth anteriorly	21	20	19	18.5	19
" " posteriorly	23.5	21	21	21	19
Interorbital breadth	33	32	32	31.5	29
Depth of skull anteriorly	40.5	37	37	35	36
" " occiput	22	23	23	21.5	22
Diastema	23	22	20	19	20
Length of palate	39	39	35	32.5	35
" " upper toothrow	20	19.3	19	17.5	18

Coendou sanctæmartæ is a small form of the *C. prehensilis* ('*Synetheres*') group, but differs from *C. prehensilis*, *C. brandti*, and *C. centralis* in being about one third smaller than either of the three forms and very differently colored, the spines being much more narrowly tipped with white, the basal white portion narrower, and the dark portion much broader, so that the general coloration of the dorsal area is blackish punctated with white, instead of white varied with black, or black and white about equally mixed. The males are much larger than the females, but the largest male skulls are very much smaller than even the smallest skulls of the *C. prehensilis* group.

The series of 5 skulls of *C. sanctæmartæ* show great variation in the amount of inflation of the frontal region of the skull. In No. 15459 (♂) the front third of the nasals is nearly flat, but at the posterior border of the front third they rise abruptly to meet the greatly inflated frontals, this enormous inflation involving also the width of the posterior arm of the premaxillaries. In Nos. 23473 (♀), 23472 (♀), there is also considerable inflation of the frontal region, but in the other two skulls (including the type) there is very little, the nasals and frontals being nearly as flat as in the *Spiggurus* group. For this reason it seems impossible to differentiate satisfactorily forms in a group subject to such an extraordinary amount of individual variation in the form of the skull as is evident in the

[1] Type.

'*Synetheres*' group without having large series of specimens for examination.

"Tree-porcupines are found occasionally both in the dry forest and in the mountains, but I could learn little about their habits; they are certainly slow and clumsy animals, commonly seen only on the larger branches of high trees, seldom on the ground. At El Libano (5500 feet) one of these animals was shot, but the specimen was lost; it was, apparently, distinct from the kind collected near Bonda." — H. H. S.

34. **Dasyprocta colombiana** *Bangs.* — Thirty-five specimens, of which 23 are skins with skulls, 3 skins without skulls, 4 skulls without skins, and 5 skeletons. They include young of various ages, as well as adults. Less than one half were sexed by the collector, and only about one fourth have flesh measurements. All were taken at or in the immediate vicinity of Bonda.

Young, about one fourth grown, are darker and deeper colored throughout than the adults, and the long black hairs of the rump lack the whitish tips present in the adults.

As the species was described from immature specimens (*cf.* Bangs, Proc. Biol. Soc. Wash., XII, 1898, p. 163), the following measurements of adults will supplement the original description.

The flesh measurements of 8 adults are as follows:

15438, ♂,	total length,	521;	tail,	37;	hind foot,	127.
15436, ♂,	"	"	545;	"	—;	"	"	140.
14871, ♂,	"	"	533;	"	—;	"	"	—.
23454, ♂,	"	"	545;	"	—;	"	"	—.
15437, ♀,	"	"	535;	"	37;	"	"	140.
15444, ♀,	"	"	610;	"	22;	"	"	140.
15445, ♀,	"	"	648;	"	—;	"	"	133.
23455, ?,	"	"	660;	"	—;	"	"	140.

Four 'old adult' skulls measure as follows: Occipito-nasal length, 121.5 (120–124); basal length,[1] 97 (95–99); zygomatic breadth, 53 (51–55); mastoid breadth, 40.5 (40–41); interorbital breadth, 33.5 (32–34); breadth across postorbital processes, 43.7 (42–45); length of nasals, 48 (47–49).

[1] Mr. Bangs gives the basal length of "a ♀ young adult," as 169.4 — obviously a typographical error for 69.4.

This species greatly resembles *D. variegata* in coloration, but it is paler, very much larger, and differs markedly in cranial details.

"AGOUTI (called *iñeki*). — Common principally in the dry forest region, in woods or thickets; I do not think that it ranges far into the mountains. It makes deep burrows under roots and brush, and its habits and food are much like those of the paca." — H. H. S.

35. **Agouti paca** (*Linn.*). — Six specimens: 3 skins with skulls, and 3 additional skulls. Five are from Bonda, and the other from Baritaca.

" PACA (so called in Colombia). — Of all the South American rodents, this is the most esteemed for food; consequently it is much hunted and, being heavy and slow in its movements, is easily killed. It is also a favorite prey of the larger carnivora, and were it less prolific it would speedily become extinct. It is now rather rare near Santa Marta. Our specimens were shot in the dry-forest region, below 2000 feet, but it ranges into the mountain forest. Pacas make deep burrows, generally under roots of trees, and they eat herbage and various forest fruits." — H. H. S.

36. **Hydrochærus hydrochæris** (*Linn.*). — One specimen, immature, Mamatoca.

"CAPIVARA (called by that name, but it was derived from Brazil; *capim-vara*, shortened to *capi-vara*, means a dweller in the grass in the Tupi language). — This is now a rare animal in the immediate vicinity of Santa Marta, though common further east and along the Magdalena flood-plain; our specimens were shot near Mamatoca, on the Manzanares River. They are never found far from the water and prefer places where there is tall grass, partly submerged. The diet seems to consist mainly or entirely of grass or certain small fruit. They are stupid animals and quite harmless. I was once knocked over by one which ran against me in the high grass near an Amazonian lake.

"Capivaras are very prolific, and a female is commonly seen with several young, all of different sizes; probably this has given rise to the idea that conception takes place during

gestation. It appears that only one young is born at a time, and probably the period of gestation is short. The flesh is considered unfit for food, owing to its strong musky odor; but this may be avoided by skinning and cleaning the animal immediately after death. I knew a planter who often gave his guests capivara meat for dinner, and they all liked it. It is white, tender, and good." — H. H. S.

37. **Sylvilagus superciliaris** *Allen.* — Twenty-four specimens, including young of various ages as well as adults, all from Bonda. (See this Bulletin, XII, 1899, p. 196.)

"RABBIT (called *conejo*). — Common in the dry-forest region, frequenting thickets and old clearings where the bushes and grass give it cover. They are nocturnal, being seldom seen during the day unless driven from their retreats; they eat tender young leaves, buds, twigs, and roots, and perhaps small fruits. I have never seen any rabbit burrows, and the hunters aver that they do not make any, but bring forth their young in sheltered places among the grass and bushes. Generally two or three young are found together. As far as I know, rabbits do not range into the mountain forest."—H. H. S.

38. **Felis concolor** *Linn.* — Not represented by specimens. Mr. Brown obtained a specimen at Santa Marta and another at Dibulla (Bangs, Proc. N. Engl. Zoöl. Club, I, 1900, p. 99).

"PUMA (called *leon*). — Found occasionally below 3000 feet, principally in the dry forest; I never heard of it in the higher mountains, and it seems to be less common than the jaguar. We did not secure a single specimen of either; this was mainly ill-fortune, but it was partly due to the fact that no good dogs could be obtained, and it is almost useless to hunt large cats without them.

"South American hunters rather despise the puma; they consider it cowardly, and not to be compared with the jaguar for fierceness, agility, or strength; apparently it never attacks a full-grown man unless it has been brought to bay. Like the jaguar, it wanders at night and during the cool hours of the day, remaining quiet in the afternoon. It is said to make its den in rocky places, under a ledge; but I cannot attest this." — H. H. S.

39. **Felis onca** *Linn.* — Not represented in the collection A specimen was obtained at Dibulla by Mr. Brown (Bangs, Proc. N. Engl. Zoöl. Club, I, 1900, p. 99).

"JAGUAR (called *tigre*). — This animal is quite common, ranging from sea-level to 6000 feet at least; but possibly those found in the mountains are another form. All over tropical America the hunters recognize two kinds of jaguars; their testimony is unanimous and I am inclined to think they are right. It is noteworthy that this distinction was recognized by the aborigines, at least those of the Tupi-Guarany stock, and they had two names, *jaguára* and *jaguára pacoua-sororoca*, the latter meaning 'jaguar of the wild plantain,' because it frequents places where the plant grows. The jaguára is almost exclusively a highland form; the other is more common along the rivers, especially on the great flood-plains like those of the Orinoco, Amazon, and Paraguay; this kind takes to the water readily and may often be seen swimming across broad rivers, as I have noted more than once. This, also, is the kind that is said to catch fruit-eating fish, attracting them by rapping the water to imitate falling fruit, and then knocking them out with its paw; once, when I was canoeing at night on one of the Amazonian channels, a sound as of dropping fruit was heard, and the Indian crew said it was a jaguar fishing; a gentleman who was with me said that he had heard the sound before, and had no doubt that the Indians were right. I mention this because the story has been published by various travellers, and has been regarded as a 'yarn.' In fact, there is nothing impossible about it; the pacu fish will come to such sounds and the ruse is used in catching them.

"According to the hunters, the two kinds of jaguar are of about the same size, but the highland form is rather more slender, with longer legs; they aver that it can be readily recognized by its cry. They say also that it is difficult or impossible to distinguish the skins of young animals, but that in the adults, the *pacoua-sororoca* has larger spots, distinctly arranged in 'roses'; in the jaguára the spots are smaller and more evenly distributed. The Santa Marta hunters speak of the two kinds, but have no distinctive names. The black

jaguar is not found at Santa Marta, and from all I have heard it seems to be almost confined to the great river plains. The hunters scout the idea that this is a variety of the jaguar; they say it is commonly larger and always fiercer, and that it has a peculiar cry; that black females always go with dark cubs and spotted ones with spotted cubs. I am more inclined to doubt this than the other report; the mere difference of appearance would lead the hunters to regard the black jaguar as distinct. Some skins which I have seen on the Paraguay were dark without being actually black, and they showed the spots plainly. If the black jaguar is a melanic variety it is of the *pacoua-sororoca*. I give these reports because they seem interesting, and hunters are generally good authorities on such questions. I may note in passing that the same men recognize only two kinds of coati (one kind in southern Brazil), though naturalists have described a great number; and they do not divide other variable species, such as the tamandua.

"Jaguars are much fiercer than pumas, and I know of several instances where they have attacked man unprovoked, even springing on him from behind, and in broad daylight. They are readily brought to bay by dogs, and fight them fiercely, often killing several before the hunters come up. The spear-hunters of the Paraguay, after bringing the jaguar to bay, provoke them to spring on the spear, which is held diagonally with the butt resting on the ground. Jaguars fight almost entirely with their paws, the claws sheathed, so that the weapon is, in effect, like a padded club. The force of their blows is very great. A large dog, belonging to one of my Brazilian hunters, was hurled twenty feet and was literally crushed against a tree trunk. I once found a deer which had just been killed by a jaguar and was still warm; it was only on close examination that I found a small scratch on the shoulder; not a bone was broken, and there was little suffusion of blood. The animal had been knocked dead with a paw like velvet.

"These animals are a great pest about cattle estates, killing calves or even old cows or bulls, and often pigs; they drag their

prey to the nearest forest to feast on it at their leisure. I never heard of them throwing a dead animal on their shoulders as tigers are said to do, and I fancy none of the cats could perform that feat. But the strength of the jaguar is sufficiently shown by its dragging large animals. In Brazil, my wife and I once followed a track on which a cow had been dragged; it was fully half a mile long, at first over open land and then in tangled forest. The carcass was found untouched, and our hunters subsequently shot the jaguar, which was hidden near by; it was not an unusually large one. . . .

"It is commonly said that jaguars will not attack a sleeping man, but will wait until he moves. A Brazilian engineer of my acquaintance, while waiting for a messenger, went to sleep in the forest; the messenger, on his return, found a jaguar 'smelling' of the sleeper, as he reported; the animal made off, but its tracks corroborated the story. I myself have found large jaguar tracks close to the hammock in which I had slept, a little away from the camp circle.

"Like most cats, they seem to fear a light at night, perhaps because they do not understand it. On one occasion while mothing in the mountain forest near Santa Marta, I carried a lantern about to examine my sugar baits; next morning we found jaguar tracks following mine for half a mile. At this place jaguars were frequently heard moving through the shrubbery, quite near our camp; and a month after we had left it, a visit to the place showed that a jaguar had occupied the improvised bed which my wife and I had slept in.

"This and other cats, as well as wild and tame dogs, are very fond of mangoes; and during the mango season they come around the settlements to eat the fruit. They often pass over several miles of country in their hunting excursions; in fact, it is doubtful if they have settled homes except during the breeding season. On one occasion our hunters tracked a jaguar for fully ten miles, on a high mountain.

"The male remains with the female while the cubs are young, and this, I believe, is the rule with all American cats; but he makes long hunting excursions while his mate remains near her cubs. Jaguars live principally on deer, pacas,

agoutis, and cattle or pigs when they can get them; more rarely they attack wild hogs or tapirs. It is certain that the *pacoua-sororoca* is an experienced fisherman, whether or not he catches fish as reported; it is also said to attack alligators and turtles, turning the turtle over and scooping it out of its shell; but I cannot attest this. Jaguars also eat several wild fruits, such as the 'hog-plum' (*Spondias*).

"The jaguar does not climb trees, at least habitually. It often 'sharpens its claws' on a tree trunk, as cats do on a chair leg; particular trees are used over and over again for this purpose." — H. H. S.

40. **Felis sanctæmartæ** *Allen.* — Two specimens, Bonda, as already recorded (this Bulletin, XX, 1904, p. 332, Oct. 8, 1904).

"OCELOT (called *tigrillo*). — Moderately common. It is found near the coast, but I do not know its mountain range, though specimens were shot at about 3500 feet; our hunters said they saw it in the Libano Mountain at nearly 6000 feet. Unlike the jaguar, it climbs trees readily, though seen quite as often on the ground. It commonly preys on large game birds as well as rabbits and other rodents, and it is a great poultry thief. Ocelots are not at all feared, and even small boys will attack them with stones. Like jaguars they are fond of mangoes and certain forest fruits. The den is said to be made in a hollow tree." — H. H. S. [Evidently Mr. Smith has not distinguished between the two — large and small — spotted cats found at Santa Marta.]

41. **Felis** sp. incog. — One specimen, adult male, and an additional skull, Bonda, March 30. This species appears to belong to the *Felis pardinoides* group, as recognized by Thomas (Ann. and Mag. Nat. Hist., (7) Aug., 1903, p. 236), but lack of material for comparison prevents a satisfactory determination. Collector's measurements: Total length, 927; tail vertebræ, 396. The skulls measure 95 x 63 and 94 x 63.

42. **Felis yagouarondi** *Desmarest.* — One specimen, adult (sex not determinable), near Bonda, March 1. The only flesh measurement available is, total length, 1018. The skull measures 109 x 66. I refer also to this species a kitten in

first pelage; it is nearly uniform black, with the tips of the hairs subapically ringed narrowly with gray.

43. **Felis eyra** *Desmarest.* — One specimen, adult female, Masinga, March 14. Collector's measurements, total length, 916; tail vertebræ, 432. Skull, 95 x 60.

"GATO PARDO. — This brown, slender cat is quite common near Bonda and along the coast, and ranges upward to at least 4000 feet. It seems to be mainly terrestrial. The only living one I have seen was standing on a rock, and it fled when my companion, a boy, threw a stone at it." — H. H. S.

44. Canis (Thous) aquilus (*Bangs*).

Urocyon aquilus BANGS, Proc. Biol. Soc. Wash., XII, 93. April 30, 1898. Santa Marta Mountains, Columbia.

Fifteen specimens (skins and skulls) not sexed, but evidently representing adults of both sexes and young adults, and 6 additional skeletons, all taken in the vicinity of Bonda, in December, January, February, May, August, September, November, and March. Only a part have external measurements. The series varies little in respect to coloration. Measurements of 7 adults, taken by the collector before skinning, are as follows:[1]

14851,	♂,	total length,	978;	tail vertebræ,	286.					
14627,	♂ ?,	" "	965;	" "	263.					
14853,	♂,	" "	959;	" "	349.					
14623,	♀ ?,	" "	927;	" "	260.					
14626,	♀ ?,	" "	914;	" "	274.					
23503,	?,	" "	927;	" "	248;	hind foot,	133.			
23504,	?,	" "	940;	" "	324;	" "	146.			

Eight adult skulls measure as follows:[1]

14627, old	♂ ?,	total length,	139;	basal length,	131.5;	zyg. breadth,	80.				
14853, ad.	♂,	" "	137;	" "	129;	" "	73.5.				
14637, yg. ad.	♂ ?,	" "	134;	" "	128.5;	" "	69.				
14625, old	♂ ?,	" "	134;	" "	127;	" "	75.				
14635, ad.	♀ ?,	" "	134;	" "	126;	" "	71.				
14623, ad.	♀ ?,	" "	132;	" "	126.5;	" "	69.5.				
14626, ad.	♀ ?,	" "	130;	" "	124;	" "	68.				
14624, old	♀,	" "	128;	" "	123;	" "	73.				

[1] The question mark after the designation for sex in both the above tables indicates that the determination is presumptive; in the other cases the sex is positively determinable by the skins.

Canis aquilus is scarcely distinguishable externally from Venezuela specimens of *C. cancrivorus* (see *antea*, p. 343). The skull, however, is shorter and broader, with relatively heavier dentition; the facial portion of the skull is very much broader than in *C. cancrivorus*. In this species, as in other numbers of the American Canidæ, except *Urocyon*, the position of the temporal ridges varies with the age of the animal; in young adults they are slightly developed, and run about midway down the parietal convexity of the skull, as in other species of *Canis;* with increase of age they become stronger and move inward, in very old specimens uniting, as usual, at least posteriorly, to form a more or less distinct sagittal crest, — an entirely different position and mode of development from the supraorbital ridges in *Urocyon*.

Two specimens received recently from Merida, Venezuela, appear also to be distinctly referable to *C. aquilus*.

"Wild Dog (called *soro*, but this name is used for various other small carnivora, sometimes *soro perro*, dog-soro). — Moderately common below 3000 feet, and may range above that; but it seems to belong properly in the dry-forest region. It is exclusively terrestrial, at most walking on logs or rocks, like a dog; it preys on small rodents, lizards, etc., and perhaps crustacea, and eats many fruits. I could learn little of its habits, but apparently it makes its home in natural crevices of the rocks or in hollow trees. The animal has a strong and sickening odor, so that skinning it is a most unpleasant job. It is very uncleanly; the pelage is commonly so soiled and matted that it can only be cleaned with great difficulty. The wild dog is diurnal, but also wanders at night, at least when it is not very dark." — H. H. S.

45. **Conepatus mapurito** (*Gmelin*). — Two specimens, Bonda and Playa Brava, January and September.

"Skunk. — Common in the dry forest, and found occasionally in the mountains to 4500 feet or higher. They live in natural crevices, stumps, etc., and appear to prey on small mammalia, birds and lizards; but the hunters avoid them and really know little about their habits." — H. H. S.

46. **Lutra colombiana,** sp. nov.

Type, No. 15479, ♀ ad., Bonda, Santa Marta district, Colombia, August 18, 1899; coll. Herbert H. Smith.

Color above pale reddish brown (between Prout's brown and hair brown of Ridgway); below pale grayish brown, the hairs and fur very pale brown basally, the hairs with long yellowish white or soiled white tips. Nose pad with the upper border double-concave, the lower border straight; transverse width, 15 mm., vertical width, 10.

Total length (type), 979; head and body, 547; tail vertebræ, 432; hind foot, 96. Two other adults are slightly smaller, the three specimens measuring: Total length, 966 (934–997); head and body, 555 (547–565); tail vertebræ, 411 (387–432). Skull (type), basal length, 101; zygomatic breadth, 67. (For detailed measurements see table below.)

Represented by 4 specimens: 1 skin and skull, 2 skins with skeletons, and 1 skeleton, all from Bonda, taken in February, August, and November. All are adult; two are sexed as females, while the sex of the others is not indicated. They differ little in color, but in the November specimen the pelage is longer, softer, and thicker than in the others.

CRANIAL MEASUREMENTS OF OTTERS.

	Lutra colombiana.[1]				*L. insularis.*[2]	*L. annectens.*[3]
	15479 ♀	23507	23494 ♀	14633	4765	6678
Occipito-nasal length..	107	103	98	103.5	107	118
Basal length.....	101	98	94	92.6	104.5	112
Zygomatic breadth....	67	—	66	64	70.5	83
Interorbital breadth...	22	22.3	21.6	19	22	25.5
Postorbital breadth....	15	15	16.3	18.5	18.5	18
Mastoid breadth.....	64.6	64	61	—	67.5	76
Length of palatal floor.	43.5	43	41	42	45	48
Inner base of incisors to end of pterygoid proc	57	56	54.5	57	60.5	64
Postpalatal length.....	49	46	46	50	50	56.5
Upper premolar - molar series.....	30	28.5	29.5	30	30	31
Lower premolar-molar series.....	34	32	31.5	34	34	36
Pm^4, length on outer border.....	12.3	12	11.3	12.4	12	12.3
Pm^4, width at middle..	10	9.7	9	10	9.5	10.2
" oblique diameter[4]	13.5	13	13	14	13	13

[1] All from Bonda (Santa Marta), Colombia; coll. H. H. Smith.
[2] Princestown, Trinidad; coll. Frank M. Chapman.
[3] Laguna de Juanacatlan, Jalisco, Mexico; coll. Dr. A. C. Buller.
[4] Diagonally from the antero-internal point of lobe to postero-outer angle of tooth.

This species agrees with other South American otters in the general form of the braincase, which is low, flat, and much expanded, in comparison with the *Lutra canadensis* group of North America, in which the braincase is much narrower, deeper, and less expanded. The audital bullæ are very small and flat, the teeth large for the size of the skull and greatly crowded in the tooth line. It differs from *L. annectens* Forsyth-Major (from Jalisco, Mexico), which also belongs to the South American group, in its much smaller size and relatively much larger teeth, particularly pm^3 and pm^4. A specimen of the latter from Laguna de Juanacatlan, Jalisco, Mexico (practically a topotype), has a basal length of 112, a zygomatic breadth of 83, and a mastoid breadth of 76, while the largest specimen of a series of four from Bonda has the corresponding measurements, respectively, 101, 67, and 64.6.

It is rather smaller even than *L. insularis* F. Cuvier, from Trinidad, which has the braincase higher and more convex, the audital bullæ about one fourth larger, and the dentition much weaker — nearly one third less massive — and the form of pm^4 is strikingly different, the postero-internal basal portion in *insularis* being very narrow, instead of very broad as in *L. colombiana*. In short, *L. insularis* is a very strongly differentiated insular type, sharply set off from the other South American otters by strongly marked dental and cranial characters.

Unfortunately, no specimens of *L. enudris* (commonly emended to *enhydris*) F. Cuvier, described from Guiana, are available for examination. According to Forsyth-Major (Zool. Anz., XX, 1897, p. 141; Ann. and Mag. Nat. Hist. (6), XIX, 1897, p. 618), the audital bullæ are less flattened than in *L. canadensis*, but in *L. colombiana* they are very much more flattened than in *L. canadensis*, in this respect agreeing with *L. insularis*. In view of the several strongly marked local forms now so well known in the *L. canadensis* group, and the striking cranial differences that distinguish the Santa Marta animal from its nearest known geographical allies — the Mexican *L. annectens* on the one hand and the Trinidad *L. insularis* on the other, — and in view of the general fact

that all the well-known forms of Santa Marta mammals, and especially the Carnivora, differ markedly from their allies from Venezuela, Guiana, and Brazil, it seems pretty evident that the Santa Marta otter forms no exception to the rule. Furthermore, the advance of our knowledge of otters in general during the last fifteen years, and particularly those of North America, renders it even more probable now than in 1889, when Mr. Oldfield Thomas wrote an excellent paper on otters in general (Proc. Zoöl. Soc. London, 1889, pp. 190–200), that his suggestion (*l. c.*, p. 199) that there may be "one, two, three, or four Neotropical species in addition to those already mentioned [*Lutra brasiliensis* and *L. felina*]," is a foresight that will be verified by the recognition of not less than four additional species or subspecies as soon as the material for their satisfactory investigation becomes available; for all of which there are probably available names, heretofore generally treated as synonyms of a supposed single wide-ranging species.

"OTTER (called *Lutra*). — Found occasionally along the larger streams, living generally in pairs or families, in holes or burrows along the forest-lined banks. It never goes far from the water, and lives on fish. Otters are easily tamed and make most amusing and affectionate pets; they become attached to particular persons, following them about like dogs and often uttering their peculiar plaintive cry. I have seen a tame otter swimming with the village boys and evidently enjoying the sport. I am told that they can be taught to fish for their masters, but have never seen this." — H. H. S.

47. **Tayra barbara irara** *Allen.* — Fourteen specimens, skins and skulls, and several additional skeletons, all collected at or near Bonda. (See this Bulletin, XX, 1904, p. 36.)

Since my former note on this species several additional specimens have been found in a lot of duplicates not at that time examined. In two the white spot on the withers is present and in two it is lacking. I notice also that Mr. Bangs (Proc. New Engl. Zoöl. Club, I, p. 100) has reported the white shoulder spot present in three out of his five specimens. It is thus present in 16 out of 20 known specimens.

"GALICTIS (called *soro-huache*). — Moderately common below 3000 feet. It is arboreal, but frequently seen on the ground; its habits seem to be much like those of the kinkajou. The hunters distinguish two kinds, differing especially in the length of the tail; whether the difference is due to age or is varietal or specific I cannot venture to decide. Both forms vary greatly in color and markings." — H. H. S.

48. **Potos flavus megalotus** (*Martin*). — Eleven specimens (5 males and 6 females, all adult), collected near Bonda, March 24–June 17, and one in July and one in August. (On the name *megalotus* see this Bulletin, XX, 1904, pp. 72–74.)

These specimens have the dorsal surface bright rusty yellow, the extreme tips of the hairs reddish brown, not black or blackish as in the allied forms; the dark dorsal streak, which is dark reddish brown, is well defined in three of the specimens, irregular and imperfect in two, and quite obsolete in the remaining two; in several of the brighter specimens the general color above is bright reddish fulvous or 'foxy red,' in others much paler; ventral surface clear pale yellow, varying to golden, especially along the middle of the abdomen; top of the head darker than the back; back of the ears not darker than adjoining pelage; a more or less dusky eyering; upper surface of tail like the back, darkening somewhat towards the tip, the lower surface dull pale yellow.

One specimen (No. 14855, ♂ ad.) is strikingly different from the rest, the general coloration, especially of the upper parts, being much paler as regards the fulvous tints, with the hairs tipped with brownish black or dusky, and so extensively as to give a blackish cast to the central part of the dorsal area, from the head to the end of the tail, the well-defined dorsal stripe being continued to the end of the tail. In general effect it is widely different from any other specimen of the series, much more resembling *Potos flavus caucensis* from the upper Cauca Valley in southwestern Colombia.

The collector's measurements are as follows:

♂,	total length,	1029;	tail vertebræ,	521;	hind foot,	114.
♂,	"	"	1026;	"	"	508;	"	"	—
♂,	"	"	1003;	"	"	489;	"	"	—
♂,	"	"	978;	"	"	457;	"	"	108.
♀,	"	"	953;	"	"	495;	"	"	108.
♀,	"	"	965;	"	"	470;	"	"	114.
♀,	"	"	915;	"	"	493;	"	"	102.
♀,	"	"	914;	"	"	464;	"	"	93.
♀,	"	"	914;	"	"	470;	"	"	102.
♀,	"	"	895;	"	"	502;	"	"	102.

In these specimens the posterior fourth of the palatal floor is abruptly and deeply depressed (from m^3 posteriorly); the teeth are of medium size, and the audital bullæ are well developed and considerably inflated. Two average middle-aged skulls, male and female, measure as follows: Total length, ♂ 89, ♀ 87; basal length (inner base of incisors to posterior border of condyles), ♂ 82, ♀ 79; zygomatic breadth, ♂ 57.3, ♀ 56.5; interorbital breadth, ♂ 19, ♀ 19; width of braincase, ♂ 36.5, ♀ 35; length of palate, ♂ 39, ♀ 36; upper premolar-molar series, ♂ 21, ♀ 19; lower premolar-molar series, ♂ 22, ♀ 20.6; length of lower jaw, ♂ 61, ♀ 59; height at condyle, ♂ 28, ♀ 29; height at coronoid, ♂ 40, ♀ 40.6.

"KINKAJOU (called *martico*). — Moderately common in forest below 3000 feet, and perhaps above that altitude; but most of our specimens were shot in the dry forest not far from sea-level. It goes singly or in pairs, is arboreal, seldom seen on the ground, and seems to be diurnal rather than nocturnal. It moves among the trees cautiously, choosing the larger branches, and does not make long leaps. It is said to live in hollows in the upper part of tree trunks; beyond that I learned nothing of its habits." — H. H. S.

49. **Procyon proteus** *Allen.* — Six specimens (2 males and 4 females, all adult), skins and skulls, Bonda. (See this Bulletin, XX, 1904, p. 333.)

"RACCOON. — Common in dry forest near the coast, and along the larger streams for a few miles inland; I do not think that it is found among the mountains [taken at 8000 feet by Mr. Brown]. It is mainly nocturnal in its habits, and is frequently hunted (for its skin) on the sand beaches during moon-lit nights. Its food consists largely of marine and fresh-water animals, fish, mollusca, and crustacea, and it also eats certain fruits.

"The *Coati* is not found near Santa Marta." — H. H. S.

50. **Myotis nigricans** (*Wied*). — Thirty specimens, Bonda (*l. c.*, p. 94 [1]).

51. **Lasiurus pallescens** (*Peters*). — One specimen, Bonda (*l. c.*, p. 94).

[1] A list of the Bats in the present collection was published in this Bulletin, Vol. XII, 1900, pp. 87–94. A few species received later are here included. The reference, "*l. c.*" refers to that paper.

52. **Saccopteryx leptura** (*Schreber*). — Seven specimens, Bonda (*l. c.*, p. 94).

53. **Saccopteryx bilineata** (*Temm.*). — Thirty-six specimens, Bonda and Minca (*l. c.*, p. 93).

54. **Peropteryx canina** (*Wied*). — Eight specimens, Bonda (*l. c.*, p. 94).

55. **Molossus bondæ** *Allen*. — One specimen, Bonda (*antea*, p. 228).

56. **Promops affinis** *Allen*. — Six specimens, vicinity of Bonda (*l. c.*, p. 91).

57. **Promops glaucinus** (*Wagner*). — Four specimens, Santa Marta, collected and presented by Mr. Francis C. Nicholas. (Not represented in the Smith collection.)

58. **Thyroptera tricolor** *Spix*. — One specimen, Cacagualito (*l. c.*, p. 94).

59. **Chilonycteris rubiginosa** *Wagner*. — One specimen, Cacagualito.

60. **Dolichophyllum macrophyllum** (*Wied*). — One specimen, Bonda (*l. c.*, p. 91).

61. **Chrotopterus auritus** *Peters*. — One specimen, Bonda (*l. c.*, p. 91).

62. **Micronycteris hypoleuca** *Allen*. — One specimen, Bonda (*l. c.*, p. 90).

63. **Micronycteris megalotis** (*Gray*). — Nineteen specimens (*l. c.*, p. 90).

64. **Trachops cirrhosus** (*Spix*). — One specimen (*l. c.*, p. 90).

65. **Phyllostomus hastatus** (*Pallas*). — One specimen, Bonda (*l. c.*, p. 90).

66. **Hemiderma perspicillata** (*Linn.*). — Twenty-three specimens, Bonda (*Hemiderma brevicauda*, *l. c.*, p. 90) and Cacagualito.

67. **Glossophaga longirostris** *Miller*. — Thirty-four specimens, Bonda and vicinity (*l. c.*, p. 89).

68. **Glossophaga soricina** (*Pallas*). — Six specimens, Bonda.

69. **Artibeus palmarum** *Allen and Chapman*. — Four specimens, Bonda (*l. c.*, p. 89).

70. **Artibeus planirostris** (*Spix*). — One specimen, Mamatoca.

71. **Uroderma bilobatum** *Peters.* — Twenty specimens, Bonda, Cacagualito, and Minca (*l. c.*, p. 89).

72. **Vampyrops vittatus** (*Peters*). — Two specimens (*l. c.*, p. 88).

73. **Chiroderma jesupi** *Allen.* — One specimen, Cacagualito (*l. c.*, p. 88).

74. **Desmodus rufus** *Wied.* — Sixteen specimens, Bonda (*l. c.*, p. 87).

75. **Diphylla ecaudata** *Spix.* — One specimen, Cacagualito (*l. c.*, p. 87).

"BATS. — In general I can give no information beyond what appears on the labels. Blood-sucking bats of at least one species [two, *Desmodus rufus* and *Diphylla ecaudata*] are common along the coast, especially near the rivers Buritaca and Don Diego; they have literally depopulated several cattle estates, and many horses, mules, and even pigs are killed by their continued work. The planters say that these bats come down from the mountains, are numerous for a few months or a year or two, and then disappear. It is certain that they appear and disappear as stated, but it is more likely that they migrate along the coast. At Don Diego we were told that these bats slept during the day about the bases of the leaf-stalks of cocoa-nut palms. We saw bats of some kind there; but before any were captured our whole party was incapacitated by fevers, and we were obliged to leave." — H. H. S.

In addition to the 26 species of bats enumerated above, two others have been recorded by Mr. Bangs, namely *Vampyrops lineatus* (E. Geoffroy) and *Dermanura quadrivittata* (Wagner), both from the Sierra Nevada de Santa Marta at from 5000 to 8000 feet altitude.

76. **Alouatta seniculus rubicunda,** subsp. nov.

Type, No. 14655, ♂ ad., Bonda, Santa Marta district, Colombia, Dec. 22, 1898; coll. H. H. Smith.

Head, neck, limbs, tail, and ventral surface dark reddish chestnut (in fresh pelage often with a blackish tone); dorsal region dark

reddish orange (in fresh pelage often deep, dark red, fading into orange in worn pelage). Facial naked parts brownish black; "scrotum snow-white, a singular and striking sexual mark" (H. H. Smith).

Total length, 1346; head and body, 597; tail vertebræ, 749. Seven adult males average, total length, 1290; tail vertebræ, 703. Skull (type), total length, 118; zygomatic breadth,—(skull broken). Nine old male skulls average, total length, 121; zygomatic breadth, 104. (For further measurements see tables below.)

Represented by 84 specimens, of which 50 are skins with skulls or skeletons, 12 are skulls without skins, and 22 are skeletons without skins. All were taken at or near Bonda, and each month of the year is represented, though very few were taken in November and June, while February, March, May, July, and August are each represented by 10 or more specimens. Both sexes and young of various ages are included. Unfortunately only a few of the specimens were sexed and measured by the collector.

This large series shows a wide range of variation in color, which proves to be entirely independent of sex or age, and largely independent of season. The head, shoulders, flanks, limbs, and tail vary from light reddish chestnut to dusky purplish chestnut, and the dorsal area from golden yellow to brilliant reddish or even clear dark red. In several of the specimens the beard and front of the head are blackish. The apical third or more of the tail is often lighter than the limbs or basal portion, the terminal third not infrequently fading out to the color of the back, this condition agreeing with the *Mycetes chrysurus* of I. Geoffroy.

The hairs individually are also variable in texture and color, the pelage being long, soft, silky and shining in the new, freshly acquired coat, and shorter, harsher, less shining and paler-colored in the worn coat. The darkest and richest-colored specimens are in fresh pelage, which, as shown by the dates of collecting, is acquired at different seasons by different individuals. In the paler, worn specimens the individual hairs are sometimes nearly concolor from tip to base; in the fresh, unworn pelage they are generally tricolor, the basal and apical thirds being much darker than the middle portion. The hairs of the dorsal region, in fresh pelage, are dusky at base, then orange, with long, dark, bright reddish tips, which later disappear to a greater or less extent by fading and wear, the basal third or fourth still retaining for a time its dark brown tint, this feature, however, varying greatly in different individuals. In fresh coat the head, neck, limbs, and tail are very dark reddish chestnut, with a decided tinge of blackish; on the head, neck, and shoulders the hairs individually have the basal third or fourth blackish brown, the middle third dark red, and the subapical fourth nearly black, and the extreme tips dark red, giving a dusky effect to the general coloration of these parts.

A. seniculus rubiginosa differs from true *A. seniculus* of Guiana in its much darker, richer coloration, and larger size. In the absence of skulls of true *seniculus* it is impossible to say whether or not they are also distinguished by cranial characters, which seems probable in view of the sharp differentiation in this respect of the red howler of the Cauca Valley from that of the Santa Marta district. That the group is sub-

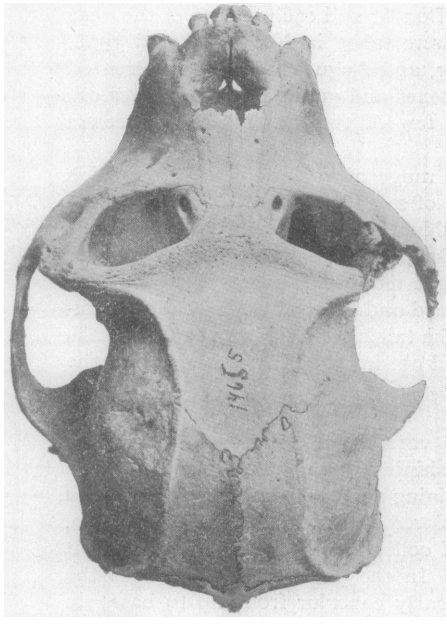

Fig. 1. *Alouatta seniculus rubiginosa.* Type. ⅔ nat. size.

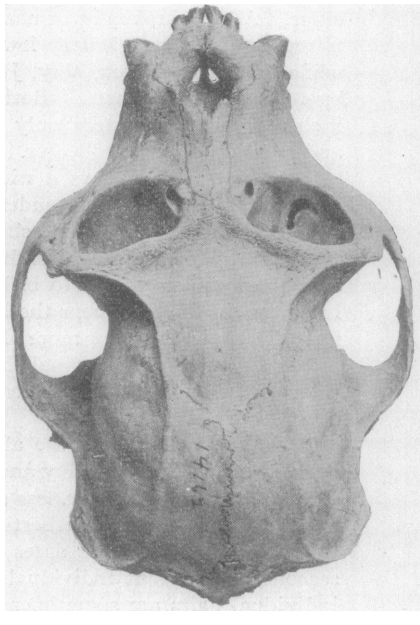

Fig. 2. *Alouatta seniculus caucensis.* Type. ⅔ nat. size.

ject to great local variation is abundantly shown by a fine series of 9 specimens from the upper Cauca Valley, collected at altitudes of from 3000 to 6000 feet in May and June, 1898, by Mr. J. H. Batty. These agree in pattern of coloration with the Santa Marta series, but differ widely in color, being many shades paler throughout, including the head, neck, flanks, limbs, and tail, as well as the dorsal area, which latter is deep straw yellow instead of reddish orange, while the

darker parts are proportionately lighter than in the Santa Marta series.

In the absence of extensive series from numerous localities, it would be presumptive to attempt to allocate the many names that have been bestowed by different authors upon the *seniculus* group of howlers. It is evident, however, that some of them have been based wholly on features subject to

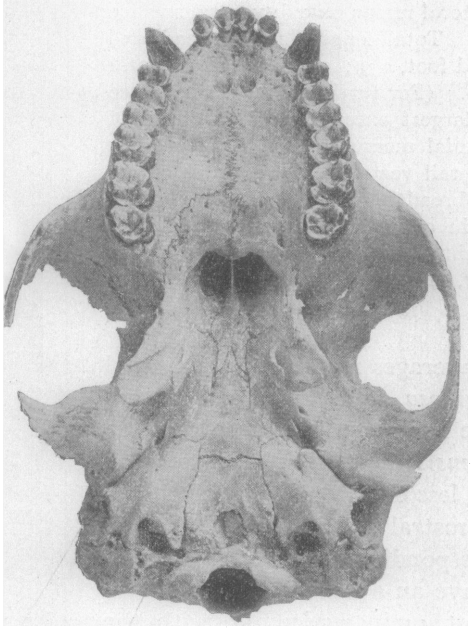

Fig. 3. *Alouatta seniculus rubiginosa.* Type. $\frac{2}{3}$ nat. size.

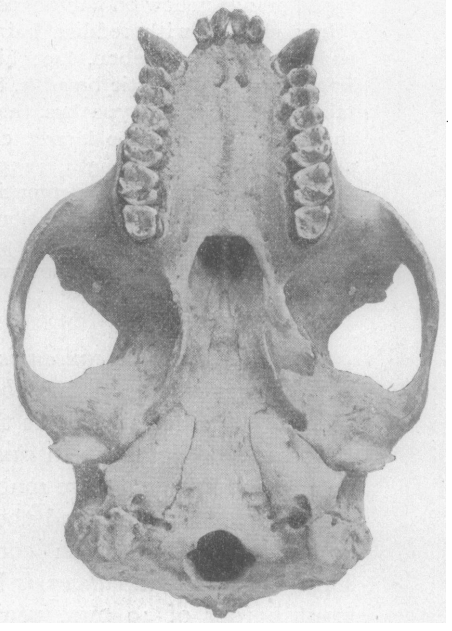

Fig. 4. *Alouatta seniculus caucensis.* Type. $\frac{2}{3}$ nat. size.

a wide range of individual or seasonal variation. As shown by the present large Santa Marta series, there is little if any sexual variation in color contrary to the belief of many of the early writers.

The Cauca series is strikingly different from the Santa Marta series, not only in color and size, but in cranial characters, as shown below. As none of the names given to this group of howlers apply well to either the Cauca or the Santa

Marta forms, either geographically or otherwise, the Cauca subspecies may be provisionally distinguished as follows:

Alouatta seniculus caucensis, subsp. nov.

Type, No. 14162, ♂ ad., Charingo (alt. 3000 ft.), upper Cauca Valley, Colombia, May 5, 1898; coll. J. H. Batty.

Head, neck, limbs and tail dark reddish chestnut, the latter much paler apically than at the base; back and sides golden yellow, deepening to orange yellow on flanks; pectoral region naked, ventral surface thinly clothed with reddish hairs. Total length, 1234; head and body, 603; tail vertebræ, 640; hind foot, 135; ear, 35. Skull, total length, 116; zygomatic breadth, 80. (For further measurements see table below.) The type has the largest external measurements of the series, but not the largest cranial measurements. Three adult males average, total length, 1155; tail vertebræ, 600; skulls of the same, total length, 119; zygomatic breadth, 77.5.

There is considerable variation in color, the brightest specimens closely approaching the faded specimens of the Santa Marta series. The two series, as a whole, however, differ strikingly in coloration, as indicated above.

Alouatta seniculus caucensis averages much less in external measurements than *A. s. rubiginosa*, and it has also a considerably smaller skull, but the most marked differences are in the cranial details. In *caucensis* the skull is narrower and flatter, the zygomata are much less expanded, the palatal region much narrower, and the rostral portion of the skull is much compressed, with correspondingly narrower nasals. Thus the nasals in *caucensis* have an average breadth at the front border of 10 mm. against 14 in *rubiginosa*, with the necessarily correlated difference in contour of the nasal region this implies, the least interorbital breadth being 2.5 mm. less in *caucensis*. In *rubiginosa* the upper toothrows in old males are often curved slightly outward and the palatal area is very broad; in *caucensis* the upper toothrows are straight and parallel, and the palatal area is much narrower, the distance between m^1 in the two forms being, respectively, 24.6 (10 males) and 21.8 (5 males). (See figs. 3 and 4.)

The following tables of measurements show the difference in size in the two forms and in cranial proportions. (The

letters y., m., and o. indicate, respectively, young-adult, middle-aged, and old.) The females average smaller than the males, but some of the old males in the Santa Marta series are smaller than some of the females. That this exceptional condition is real and not due to mistakes on the part of the collector in sexing is shown by the skins, in which the sex is unmistakably evident.

External Measurements.

A. Alouatta seniculus rubicunda.

23373	♂	Total length,	1308;	head and body,	622;	tail vertebræ,	686.
23371	♂	"	"	1308;	"	"	"	——;	"	"	——.
23374	♂	"	"	1219;	"	"	"	571;	"	"	648.
23376	♂	"	"	1308;	"	"	"	590;	"	"	718.
23385	♂	"	"	1133;	"	"	"	415;	"	"	718.
25754	♂	"	"	1410;	"	"	"	——;	"	"	——.
14655	♂	"	"	1346;	"	"	"	597;	"	"	749.
14653	♀	"	"	1270;	"	"	"	559;	"	"	711.
14654	♀	"	"	1245;	"	"	"	534;	"	"	711.
14656	♀	"	"	1219;	"	"	"	559;	"	"	660.
23377	♀	"	"	1320;	"	"	"	571;	"	"	749.
23757	♀	"	"	1270;	"	"	"	540;	"	"	730.
23360	♀	"	"	1270;	"	"	"	——;	"	"	——.
23361	♀	"	"	1295;	"	"	"	——;	"	"	——.

B. Alouatta seniculus caucensis.

14162	♂	Total length,	1243;	h. and b.	603;	t. vert.	640;	h. foot,	135;	ear,	35.
14163	♂	"	"	1185;	"	"	"	574;	"	"	611;	"	"	135;	"	33.
14168	♂	"	"	1045;	"	"	"	495;	"	"	550;	"	"	130;	"	32.
14170	♀	"	"	1014;	"	"	"	483;	"	"	531;	"	"	125;	"	30.
14167	♀	"	"	1050;	"	"	"	494;	"	"	556;	"	"	126;	"	32.

Cranial Measurements.

Alouatta seniculus rubiginosa.

	14655 ♂ o.	14651 ♂ o.	14647 ♂ m.	23380 ♂ o.	23364 ♂ o.	23370 ♂ o.	23354 ? o.	23369 ♂ o.	23379 ♂ o.	23372 ♀ o.	23355 ♀ o.	23358 ♀ o.	23338 ♀ o.	14649 ♀ o.	14654 ♀ o.	14660 ? o.	14653 ♀ o.	Average. 8 males	Average. 8 females.
Total length	118	117	122	122	118	117	116	125	127	121	111	99.5	105	103	116.5	114	107	121	109.6
Basal length (Hensel)	104	98	100.5	106	101	97	98	111.5	113	103	93	84	85	86	87	93	85	104	89.5
Zygomatic breadth	—	79	76	82	78	79	79	84.5	84	79	72	69	72	70	—	79	68.5	80.3	72.7
Postorbital breadth	46.5	46.5	44	45	38	39	41.5	38	42	40	44.5	44	46	37	44	45	46	42.5	43.2
Interorbital breadth	15.5	14	14	15	12	15	15	16	17.5	17	15	14	14	14.5	13	13	14	14.8	14.3
Orbital breadth	74	66	67	69	66	69	69	74	74	74	64	62	62	60	60	65	60	70	63.3
Mastoid breadth	58.5	59.5	61	61	58	59	62	61	63	56	55	52.5	51	53	58	57.5	56	60	54.8
Palatal breadth at m^1	27	24	25.5	23	24	22	23	26	26	25	21	21	21	21	22	23	21	24.6	21.9
Rostral breadth	32	30.5	30.5	33.5	33	28	33	35	34.5	34	27	26	25.5	25	27.5	29	26	32	27.5
Palatal length	46.5	40	43	45.5	42	43	42	49	46	45	39	36	37	34	38.5	39.5	38	44.3	38.4
Postpalatal length	59	57	58.5	61.5	60	54	56.5	64	63	57	54	49	48	52	46.5	54	46.5	59.6	51
Front width of nasals	14	13	14	—	13	13.5	18	16	18	—	—	11	13	11.5	12	11	12	14.5	11.7
Upper prem.-molar series	36.5	34.5	38	36.5	36	35	37	36.5	35.3	35	32.5	34	33	32	34.6	35.5	37	36	34.2
Lower prem.-molar series	40	39	43.5	39.5	39	37.5	40	41	40	39	37	37	35	36	38	40	40	40	37.7
Length of lower jaw	101	99	98	100	96	95	92	106	104	100	88	81	83	81	84	90	82	100	86
Height of lower jaw	72	69	72	70	71	69	70	77	74	76	60	58.5	61	60	57	64	57	71.8	62

Alouatta seniculus caucensis.

	14162 ♂ o.	14165 ♂ m.	14163 ♂ o.	14164 ♂ o.	14166 ♂ y.	14168 ♂ m.	14167 ♀ o.	14170 ♀ m.	Average. 6 males.	Average. 2 females.
Total length	116.5	117.5	123.5	—	119	106	100	97	116.5	98.5
Basal length (Hensel)	97	96	104	103	86	85	81	—	95.1	81
Zygomatic breadth	80	77	82	81.5	70	67.5	69	64	76.3	66.5
Postorbital breadth	41	41	44	38	46	42	40.5	45	42	42.7
Interorbital breadth	13	11	15	14	11	12.5	13	10	12.7	11.5
Orbital breadth	67	64.5	69	68.5	64	59	58.5	54	65.3	56.22
Mastoid breadth	58	56	59	57	54	51	53	51.3	55.8	52
Palatal breadth at m^1	22	22	22	23	21.2	20	20.3	20	21.5	20
Rostral breadth	30	28.5	34	31	28.5	25	26	21	29.5	23.5
Palatal length	41	42	41	44.5	36	36	35	32	40	33.5
Postpalatal length	56	55	55.5	58	50	47	47	—	53.5	47
Front width of nasals	9.5	9	10	11	9.3	8	8	8	9.4	8
Upper premolar-molar series	36	36	36	36.5	35	35	33	31	35.7	32
Lower premolar-molar series	41.5	41	42	41.5	41	38	36.5	34	40.8	35.2
Length of lower jaw	94	94	101	99	84	80	80	71	92	75.5
Height at condyles	68	63	81	70	60	55	54	50	66	47

"HOWLING MONKEY. — This is found both in the dry forest and mountain forest, ranging, apparently, to about 4500 feet; but it is more common near the coast. Howlers go in bands, commonly of five or six, led by an old male; they travel among the higher branches, rarely approaching the ground, and the males keep up a continuous rumbling cry, which may be heard sometimes at a distance of a mile or more. This sound is often heard at night, and it is evident that the animals travel then, though perhaps not when it is very dark.

"Of all American monkeys the howlers are the most intractable in captivity; we have tried to tame young ones, but they always showed resentment and fear, refused their food, and soon died. A *Cebus* or spider monkey, with the same treatment, becomes tame in a few days.

"The Santa Marta male howlers have the scrotum snow-white, a singular and striking sexual mark. I do not remember to have observed this in any of the Brazilian howlers, but I may have forgotten it. In other respects this species looks much like the red howler of the Amazon." — H. H. S.

77. **Aotoes lemurinus** (*Is. Geoffroy*).—Two specimens, Bonda, Nov. 18, and Valparaiso, June 29. The former, No. 14567, has been mounted, so that the skull is not available for examination; the latter, No. 15483, a young female, is much grayer and less rufous.

That the Santa Marta specimens are not *Aotoes felinus* (Spix) is evident from the color of the throat and fore neck, which is gray, in abrupt contrast with the rest of the ventral surface, instead of orange, uniform with the ventral surface, as in *A. felinus*.

The type locality of Is. Geoffroy's *Nyctipithecus lemurinus* was Santa Fé de Bogota, Colombia, and the species is represented in the Museum collection by a mounted topotype, in excellent preservation, purchased many years since from the Verreaux Brothers of Paris. Geoffroy described the species (Arch. du Mus., IV, 1844, p. 24, pl. ii), "d'après les peaux et les crânes de plusieurs individus des deux sexes et de différents ages, que le Museum d'histoire naturelle avait reçus de Santa Fé de Bogota." He noted considerable variability in

color in this series, which he considered due to individual variation, as it was evidently not sexual.

The Museum Collection contains 7 specimens from the upper Cauca Valley (alt. 6000 feet), Colombia, collected by Mr. J. H. Batty, which I also refer to *A. lemurinus*. They include adults and young adults of both sexes, but unfortunately only four of the skins are accompanied by skulls. This series is exceedingly variable in details of coloration, varying individually in the amount of rufous and black, as described by Geoffroy. Yet it is impossible not to believe that they all represent a single variable species. They show essentially a close agreement with the topotype of *A. lemurinus* in size, proportions, and in the prevailing features of coloration. No. 14567, from Bonda, can be closely matched by several specimens in the Cauca series, and is also not appreciably different from the Bogota specimen. The other (No. 15483, from Valparaiso) is paler and grayer, with the ventral surface much paler and with much less rufous suffusion pervading the general pelage. The Valparaiso specimen is much more different from the Bonda specimen than the latter is from several of the Cauca specimens, but there is one Cauca specimen which closely resembles it. With larger series from each of these three localities it might be possible to distinguish a small amount of local differentiation in color or other features, but the material at present available for examination does not warrant such procedure.

According to Mr Brown's flesh measurements of two specimens taken by him at Santa Marta, near Bonda (Bangs, Proc. New Engl. Zoöl. Club, I, p. 102), the length of the tail vertebræ is considerably greater than half the total length; in the Smith specimens and in the Batty specimens these two measurements are equal. It is probable, however, that the method of measuring was not the same in all three cases. Spix says, "cauda corpore multo longiore," while his measurements are: "trunci 1′ 1½″, caudæ, 1′ 2″" which makes a difference of only half an inch between the two measurements. Adding the head — "capitis 2⅓″" — makes the head and body longer than the tail! In other words, the commonly

assumed difference in the relative length of the tail in the two species — *A. felina* and *A. lemurina* — is erroneous.

"NOCTURNAL MONKEY. — I know nothing of these monkeys except that they are occasionally found in the dry forest, near sea-level, sleeping in hollow trees during the day; generally two or three are found together. The few specimens brought in were very fat, even the skin being so oily that it was preserved with difficulty, and we lost several. The species may be more common than it appears; it is seldom observed owing to its habits." — H. H. S.

78. **Cebus capucinus** (*Linn.*). — Thirty-two specimens, of which 27 were taken at or near Bonda, 4 at Minca, and 1 at Cacagualito. They include many adults of both sexes, as well as immature specimens of various ages. Nearly every month is represented, but they were taken mainly in March and April (5), October and November (6), and July and August (6). Even the adults are exceedingly variable in coloration, and thus conform to what other authors have written of this feature of the species.

Absence of material from Guiana, the type locality, or from any other localities, renders a comparative study of this fine series impossible.

The following external measurements are from the collector's labels, except that the head-and-body length is obtained from subtracting the tail length from the total length. As so often happens in mammals, and especially in those with long tails, the tail in the female is relatively longer than in the male.

EXTERNAL MEASUREMENT.

14620	♂	Total length,	959;	head and body,	495;	tail vertebræ,	464.
14849	♂	"	"	965;	"	"	"	508;	"	"	457.
15481	♂	"	"	965;	"	"	"	533;	"	"	432.
23392	♂	"	"	1003;	"	"	"	508;	"	"	495.
23394	♂	"	"	976;	"	"	"	472;	"	"	457.
23395	♀	"	"	889;	"	"	"	383;	"	"	504.
23396	♀	"	"	895;	"	"	"	400;	"	"	495.
23753	♀	"	"	914;	"	"	"	519;	"	"	495.
23751	♀	"	"	838;	"	"	"	393;	"	"	445.
14616	♀	"	"	876;	"	"	"	419;	"	"	457.
14617	♀ juv.	"	"	832;	"	"	"	444;	"	"	388.
14621	♀	"	"	876;	"	"	"	441;	"	"	435.

The largest male skulls have a total length of 96 to 100 mm., and a zygomatic breadth of 66 to 73; the largest female skulls, 88 to 95 by 58 to 61.

"BROWN MONKEY (called *Mico*). — The range is almost exactly the same as that of the howler, but the species is rather more common; it is often seen in pairs or bands of three or four. Micos are more active than howlers, taking long leaps from tree to tree; in so doing the tail is used precisely like a fifth hand, clasping the nearest branch when they alight. I have never seen these monkeys swing by their tails, though they sometimes swing by the posterior hands, using the tail as a fulcrum. But, as a rule, monkeys in the forest swing very little; they walk easily on the upper side of a branch, leaping to the nearest branch of the adjoining tree on the line of travel, or sometimes crossing by a vine-stem. They always follow a leader, presumably an old male, and they move after him in single file. Micos are very curious; if a man is passing beneath they stop to look at him, peering down through the foliage. Young ones are easily tamed, but in captivity they are mischievous and often fractious; generally they become attached to particular persons. Tame ones which we have kept slept all night, and I do not think this species travels after sunset. Micos are esteemed as food by the natives." — H. H. S.