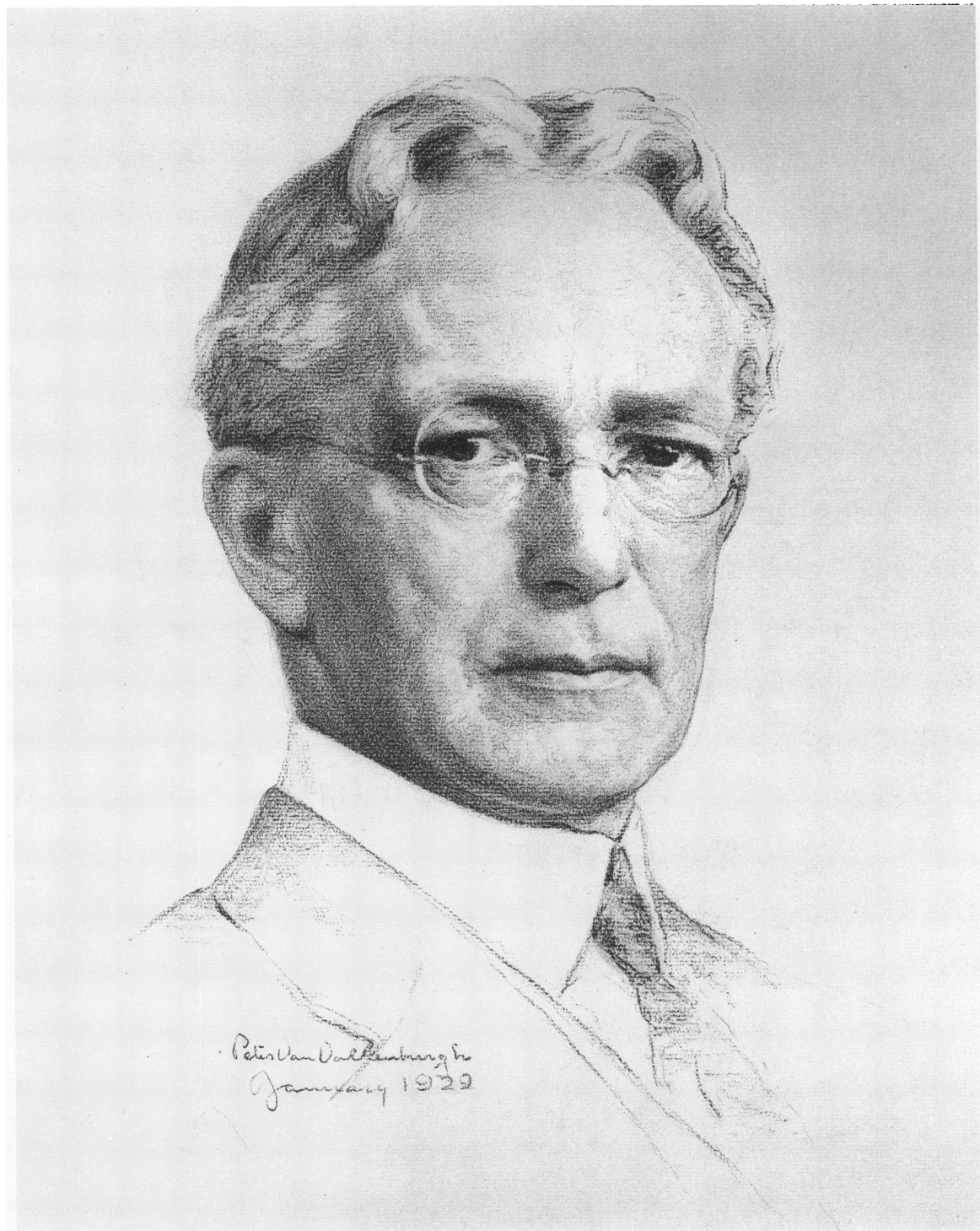


THE CUBAN EDENTATES

WILLIAM DILLER MATTHEW AND
CARLOS DE PAULA COUTO

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 117: ARTICLE 1 NEW YORK: 1959

THE CUBAN EDENTATES



WILLIAM DILLER MATTHEW
(1871-1930)

One of the outstanding figures in vertebrate paleontology of his time, and of all time, William Diller Matthew wrote, from 1892 up until 1930, more than 215 papers, most of them on fossil mammals. To his shining talent we owe notable contributions to vertebrate paleontology, especially mammalian paleontology. He was the first paleontologist to study carefully the fossil mammals from the Pleistocene of Cuba

THE CUBAN EDENTATES

WILLIAM DILLER MATTHEW AND
CARLOS DE PAULA COUTO

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 117 : ARTICLE 1
NEW YORK : 1959

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 117, article 1, pages 1-56, text figures 1-5,
plates 1-42, tables 1-36

Issued April 20, 1959

Price: \$2.50 a copy

FOREWORD

GEORGE GAYLORD SIMPSON

FOSSIL SLOTHS WERE DISCOVERED in Cuba in 1861, but nearly half a century elapsed before the discovery led to serious scientific investigation. It was then followed up by the late Carlos de la Torre, one of the most distinguished Latin-American naturalists, Professor of Zoology in the University of Havana. De la Torre soon invited the American Museum of Natural History to join him in this work, and, as related in the present monograph, Barnum Brown, of this Museum, collected in Cuba in 1911 and 1918, mostly from the *casimba* fissure deposits in the Sierra de Jatibonico and somewhat similar deposits at the original discovery site, in the hot springs of the Baños de Ciego Montero. The resulting collections of fossil vertebrates, the largest ever made in Cuba, include a great variety of animals but are especially rich in sloths. At de la Torre's suggestion, the combined collections were placed in the supremely capable hands of the late William Diller Matthew at the American Museum of Natural History for description. Matthew (1919a, 1919b) promptly published essential data on the then new materials, but without full and detailed descriptions.

Two composite skeletons of the most abundant Cuban sloth in Brown's collections, *Megalocnus rodens*, were immediately assembled from the numerous dissociated bones and mounted in the fossil vertebrate laboratory of the American Museum. One, in walking pose, was exhibited in that Museum,¹ and the other, partially erect with the forefeet on a simulated tree, was sent to the Museo Poey of the University of Havana, where it has been on exhibition ever since. In consideration of assistance rendered to Brown in the field by the late Thomas Barbour of the Museum of Comparative Zoölogy of Harvard College, some specimens were also placed in that institution. These eventually included a

third composite skeleton of *Megalocnus rodens*, assembled and restored by Charles Lang at the American Museum.² Under the original agreement between de la Torre and Matthew, the numerous other specimens of sloths were to be kept together until they had been thoroughly studied and were then to be divided between the Museo Poey and the American Museum.

Matthew worked as steadily on this project as his numerous other commitments permitted. By 1927, when he left the American Museum to become Professor of Paleontology at the University of California (Berkeley), he had nearly but not quite completed an extensive monograph on the Cuban sloths. He was unable to return to the subject before his premature death in 1930, and his incomplete manuscript continued to be held in the Osborn Library of the American Museum, available for consultation but unpublished as a whole. Brief diagnoses of new genera and species were extracted from the manuscript and published shortly after Matthew's death (Matthew, 1931).

Twenty years passed without its being possible to arrange for the final monographing of the collection, or the completion and editing of Matthew's monograph, by a competent authority. In 1951 it had just been decided that the collection must nevertheless be broken up and a large part of it sent to the Museo Poey when the long-awaited opportunity finally arose. Carlos de Paula Couto, an outstanding student of South American fossil mammals in general and ground sloths in particular, was then on leave from the Museu Nacional in Rio de Janeiro and working in the American Museum in New York on a Guggenheim Fellowship. He agreed to study the whole collection of Cuban sloths and to complete, revise, or supplement Matthew's manuscript. That work, a heavy addition to Paula Couto's other activities, has now been completed and is presented in the following pages. Thus, nearly a century after the first discovery, rather full knowledge of the Cuban sloths is finally published.

² This skeleton has not yet been mounted.

¹ A free mount, displayed as a separate exhibit for about 35 years. It has recently been renovated and incorporated in a large ground sloth group, which will be the culminating feature of a new hall now being installed. Both original mounts of *Megalocnus* were made by the late Adam Hermann.

It was Paula Couto's decision to retain as much as possible of Matthew's original manuscript in the original words. The passage of time and increase in relevant knowledge have inevitably demanded emendations, and the incompleteness of the manuscript called for extensive additions. Paula Couto has, nevertheless, preferred to present the monograph as a joint production with Matthew as his senior co-author.¹

This is an unusual collaboration in which the senior author has long since passed from the scene and the two co-authors never met each other. As the senior author could not be consulted, it has seemed important to maintain the integrity of his text and to indicate the authority for each passage or even, when necessary, single word. An author's initials

¹ It was Matthew's original intention to publish the monograph as by Carlos de la Torre and W. D. Matthew. However, the anticipated contribution from de la Torre was never received, and no work directly by him was incorporated in Matthew's manuscript or is involved in the present publication. Thus de la Torre cannot in any proper sense be considered a co-author, in spite of the fact that the initiation of the work was largely due to him and that so much is owed to his inspiration and cooperation.

in parentheses (W. D. M., or C. P. C.), when centered on a separate line, indicate individual authorship of *all that follows*, until the other author's initials, treated in the same way, are encountered. In text by Matthew, short emendations or interpolations by Paula Couto are enclosed in brackets, [], without initials. The only exceptions are such purely stylistic minor changes as are commonly made by an editor without necessarily consulting the author, or in a few instances changes that are explained in footnotes. The authorship of each footnote is indicated by initials at the end of the footnote. The tables of measurements are all by Paula Couto except the measurements of *M. ursulus* in table 14, which are by Mary B. Patsuris. At Paula Couto's request, I have added a short, signed appendix and have assisted in the editing of the whole text. Figures 1A, C, 2-4 were prepared by Lindsey Morris Sterling under the direction of Matthew. Figures 1B and 5 were prepared by Chester S. Tarka. Mrs. Rachel H. Nichols, Mrs. Mary B. Patsuris, and Mrs. Judith Pravda of our staff have aided notably in putting the whole monograph into final shape for publication.

CONTENTS

FOREWORD. GEORGE GAYLORD SIMPSON	5
INTRODUCTION	8
Abbreviations Used	8
Summary of the Geology of the Deposits and Occurrence of the Fossils.	8
History of the Discoveries	9
Amount and Character of the Material	11
SYSTEMATICS	13
<i>Megalocnus</i> Leidy, 1868	13
<i>Megalocnus rodens</i> Leidy, 1868	24
<i>Megalocnus rodens rodens</i> Leidy, 1868	26
<i>Megalocnus rodens casimbae</i> Matthew (in Schedis), New Subspecies	27
<i>Megalocnus ursulus</i> Matthew (in Schedis), New Species	30
<i>Mesocnus</i> Matthew, 1919	31
<i>Mesocnus browni</i> Matthew, 1931.	31
<i>Mesocnus torrei</i> Matthew, 1931	39
<i>Acratocnus</i> Anthony, 1916	40
<i>Acratocnus antillensis</i> (Matthew, 1931)	41
<i>Microcnus</i> Matthew, 1919	44
<i>Microcnus gliriformis</i> Matthew, 1931	44
AFFINITIES OF THE CUBAN GROUND SLOTHS	47
APPENDIX: NOTE ON BIOMETRY AND SYSTEMATICS. GEORGE GAYLORD SIMPSON	51
LITERATURE CITED	55

INTRODUCTION

(C. P. C.)

WHILE I WAS IN THE United States of America, in 1951, on a fellowship of the John Simon Guggenheim Memorial Foundation, my attention was attracted to the important collection of fossil ground sloths from the Pleistocene of Cuba in the Department of Geology and Paleontology of the American Museum of Natural History. My interest in that collection coincided with a request of the Museo Poey de la Universidad de la Habana to have the greater part of the collection returned to Cuba. Through the courtesy of Dr. George Gaylord Simpson, then Chairman of that Department, who was interested in having the whole collection studied as a series before being broken up, I was able to go over it and to complete Matthew's important manuscript on the Cuban edentates. On conclusion of the study, about 50 good specimens were sorted and returned to the Museo Poey de la Universidad de la Habana. With the authorization of Dr. José Alvarez Conde, then director of the museum in

Havana, a small collection was sent to the Museu Nacional, Rio de Janeiro, to be exchanged for fossil Pleistocene material from Brazil.

I want to thank Dr. Simpson and the American Museum of Natural History for the opportunity to complete Matthew's observations on this important collection, and Dr. Alfred Sherwood Romer and the Museum of Comparative Zoölogy of Harvard College for permission to study the Cuban fossils in that museum and for photographs of some of the best specimens. Dr. C. Lewis Gazin and the United States National Museum, in Washington, permitted me to examine the fossil ground sloth material from Haiti in that museum, and provided photographs of their best specimens. I want also to thank the Conselho Nacional de Pesquisas, Rio de Janeiro, for a grant that permitted me to devote full time to paleontological research and facilitated the completion of the present paper.

ABBREVIATIONS USED

The following abbreviations are used to designate the collections to which reference is made in the text:

A.M.N.H., the American Museum of Natural History
M.C.Z., Museum of Comparative Zoölogy at Harvard College, Cambridge, Massachusetts
M.N.R.J., Museu Nacional, Rio de Janeiro, Brazil
M.P.U.H., Museo Poey de la Universidad de la Habana, Havana, Cuba

The following abbreviations pertain to the tables:

L, length
W, width
a, approximate

As explained in the foreword, (W. D. M.) and (C. P. C.) indicate authorship by William Diller Matthew and by Carlos de Paula Couto, respectively.

SUMMARY OF THE GEOLOGY OF THE DEPOSITS AND OCCURRENCE OF THE FOSSILS

(C. P. C.)

According to Brown (1913 and MS.) the bulk of the collection is from Baños de Ciego Montero, a well-known health resort of Cuba, in Las Villas Province about 30 miles southwest of Cienfuegos. At that locality there are three distinct thermal springs with temperatures of 94°, 96°, and 98° F., respectively. A small hotel is built over the 96°

spring, and the 98° spring is known as the Chapepote. The latter is the spring in which the original edentate jaw (*Megalocnus rodens*) was said to have been discovered by José de Figueroa, a student of the University of Cuba, in 1861, and at that time it was overgrown with tall grasses and rushes. The bone deposits consisted of black Pleistocene

mud filling a pool about 10 feet deep, excavated in a Cretaceous deposit which lies over basaltic rock. The later work there under Brown took about four weeks of excavating and continuous pumping of the spring before the bottom on the basaltic rock was reached.

According to Brown, the surface of the country surrounding the Ciego Montero springs is rolling and covered by wild vegetation and by cane fields. Between Baños de Ciego Montero and Cruces there are elevated lomas, or hills, with decomposed, crystalline basaltic rock outcropping at intervals. The intervening country has a reddish surface soil, composed chiefly of clay with some ironstone. The springs come up through the basaltic rock and into an overlying upper Cretaceous deposit, from which a fine collection of fossil shells and crustaceans was obtained by Brown in a railroad cut one-half mile southeast of Baños de Ciego Montero.

The Chapepote spring in Baños de Ciego Montero was not exhausted by Brown, for all of the bones obtained were taken from an area of not more than 6 or 8 feet on either side of the outlet, and when work was given up bones were still equally abundant in the surrounding clays.

Brown believes that the fossiliferous mud deposits in the springs resulted from periodic

overflows of the small Analla River, a quarter of a mile distant, during prehistoric times. He says that, while working at the spring, a heavy rain storm fell on the region, and the Analla River overflowed its banks, one of its branches having surrounded the hotel, and flowed across the Chapepote spring, or *casimba*, and brought into it turtles and fishes and many remains of other recent animals.

Fossil cones of Recent conifers, *Pinus caribaea* (after Brother Léon in Williams, 1950, p. 11, footnote), a species now found not nearer than 150 miles from the springs, indicate that the climate of the region during Pleistocene times was different from that of today. More widespread occurrence of pines is believed to have been characteristic of the colder stages of the Pleistocene, which may have been the cause, or one of the principal causes, of the extinction of entire groups of ancient West Indian vertebrates.

The fossil bones at the fissure, or *casimba*, deposits in the Sierra de Jatibonico, in the eastern part of Las Villas Province, are more or less of the same nature as those of Ciego Montero. The fossiliferous fissure in the Sierra de Jatibonico was about 15 feet deep by 300 feet long, and in communication with a small cave.

HISTORY OF THE DISCOVERIES

(W. D. M.)

The bulk of the material here described is from the Ciego Montero locality. The first specimens discovered here were found by José de Figueroa in 1861 and submitted to Professor Poey, who presented them before the Academy of Sciences of Havana. The earliest scientific description of this material was published almost at the same time by Joseph Leidy in Philadelphia and by Alphonse Pomel in Paris. Leidy's notice has priority of publication by a few months, and was based upon his examination of a drawing of a lower jaw, the only mammal found, together with specimens of tortoise and alligator remains. Leidy recognized the true affinities of the lower jaw, which had at first been mistaken for a gigantic rodent, to the ground sloth *Megalonix*, and indeed some-

what overestimated the closeness of its relationships to that animal by allowing it only subgeneric rank.

Pomel [1868a], who had the original specimen before him, likewise estimated the jaw as a subgenus of *Megalonix*, calling it *Myomorphus cubensis*. He gives a more detailed description and comparison than is contained in Leidy's short note, and concludes by saying that it differs as much from the typical *Megalonix* as do *Scelidotherium* and *Gnathopsis* from *Mylodon*, and that "*la présence d'un grand édenté fossile à Cuba fait présumer que la faune quaternaire des Antilles se rattachait à celle du continent américain.*"

In a later note Pomel [1868b] says that in [de] Castro's paper of 1864, of which he had not previously known, the affinities of the

TABLE 1
LIST OF THE PLEISTOCENE AND SUB-RECENT CUBAN FAUNAS
(C. P. C., in part after Williams, 1950, p. 10.)

	Ciego Montero	Casimba	Caves (Various)
Edentata			
Megalonychidae			
<i>Megalocnus rodens</i>	Abundant	Abundant	—
<i>Megalocnus ursulus</i>	?	Scarce	Rare
<i>Mesocnus browni</i>	Scarce	Scarce	—
<i>Mesocnus torrei</i>	Rare	Common	—
<i>Acratocnus antillensis</i>	—	Scarce	—
<i>Microcnus gliriformis</i>	Rare	Rare	—
Rodentia			
Octodontidae			
<i>Capromys</i> sp.	—	—	Present ^a
<i>Geocapromys columbianus</i>	Rare	Rare	Abundant
<i>Boromys</i> sp.	—	—	Abundant
Insectivora			
Nesophontidae			
<i>Mesophontes micrus</i>	Rare	—	Common
Testudinata			
<i>Testudo cubensis</i>	Abundant	Abundant	—
<i>Pseudemys</i> cf. <i>decussata</i>	Abundant	Abundant	Present
Crocodylia			
<i>Crocodylus rhombifer</i>	Abundant	Abundant	—
Aves, Sauria, Salientia			

^a Common in uppermost levels, not in older deposits. (W. D. M.)

jaw had already been recognized, following Leidy's identification of the drawing submitted to him. He evidently [did] not know that Leidy had published the notice in the Philadelphia Academy Proceedings. He comments also upon de Castro's evidence for union of Cuba with the mainland, and is rather skeptical as to the supposed horse and hippopotamus remains. One specimen of the hippopotamus tusks he has himself seen, and this, at least, belongs to the living African species and is not a fossil.

In spite of the statements of Leidy and Pomel, most writers regarded the Cuban species as *Megalonyx*, identical with the North American Pleistocene genus, and as indicating a Pleistocene union with the mainland, probably by way of Florida.

No further explorations in Cuba were made [until about 1910], and, partly through the political disturbances in that country, partly through the diversion of interest to the great flood of discoveries in the western

United States that commenced about 1870, the Cuban fossils dropped more or less out of sight. De la Torre, who had succeeded Poey in the chair of zoology at Havana, was keenly interested in them, however, and made various attempts from time to time at further search, at first without much success. Finally he succeeded in getting a considerable collection from the Ciego Montero spring and in locating a number of promising deposits, fissure springs in the Sierra de Jatibonico, from which he secured a considerable, although fragmentary, collection.

This material was partly studied by him and entrusted to the [American] Museum for more thorough research, in connection with further explorations. In 1911, Barnum Brown, with de la Torre's aid and guidance, completed the exploration of the Casimba localities and obtained a large collection from Ciego Montero, and in 1918 he completed the exploration of the Ciego Montero spring.

These collections are the subject of the present [paper]. There are, in addition, important collections obtained from various caves on the island, especially from [Jatibonico]. Other more scanty and fragmentary collections have been secured in the Isle of Pines, [140 miles south of] the west end of the island, and from caves at the eastern end. These have been in part described in articles by G. M. Allen, G. S. Miller, and H. E. Anthony. Their evidence is discussed, so far as available, in dealing with the faunal relations, but the material has not been completely studied or described, and conclusions based upon it are necessarily provisional.¹

The Casimba fauna and the fauna from Ciego Montero are not wholly the same

either as to general content or as to species. Yet they do represent much the same facies; the relative abundance of the different types is about the same, but in the Casimba there is a larger variety of ground sloths, and the most abundant *Megalocnus* is a smaller variety or species. In most of the caves the fossils are chiefly rodents, insectivores, and bats; ground sloths and crocodiles are rare or undiscovered. In the spring deposits the reverse holds true.

(C. P. C.)

The collections include the forms listed in table 1.

AMOUNT AND CHARACTER OF THE MATERIAL

(W. D. M.)

From Ciego Montero I have before me five skulls and [two] half skulls of *Megalocnus*, [four] lower jaws and [23] right or left rami, [18 isolated] teeth, and the usual proportion of skeleton bones. The material is much of it well preserved, but not quite good enough throughout for association of parts to be worked out by the method of accurate fitting of articulations and tooth wear used with great success in the much larger series of *Moropus* in the Agate quarry of Nebraska.²

¹ According to Dr. Oscar Arredondo (personal communication) the Sociedad Espeleológica de Cuba, Havana, has been making extensive scientific exploration in Cuban caves since 1946. As a result of that work, a good collection of fossils of extinct and living mammals, reptiles, and birds, including *Megalocnus*, *Mesocnus*, *Microcnus*, *Geocapromys*, *Capromys*, *Boromys*, *Solenodon*, and *Nesophontes* among the mammals, and *Testudo cubensis*, snakes, and small lizards among the reptiles, has been made. I want to thank Dr. Arredondo, director of the section of geology and paleontology, and Dr. Antonio Núñez Jiménez, vice president, of that society, for placing the entire collection at my disposal for study. (C. P. C.)

² The methods used to associate individuals in this and similar cases have never been clearly stated and are perhaps not generally understood. Osborn's brief notice published in the Bulletin of the Geological Society of America (1918, vol. 29, pp. 131-133) makes some allusion to the elaborate series of measurements subsequently taken, but it should be stated that no measurements, or very few, were taken or used for the purpose

The only certain associations were of a few vertebrae found articulated and a few limb or foot bones in which the facets fitted accurately so that there could be no doubt of their pertaining to the same individual. For the rest, the associations used for assembling . . . two composite skeletons [one of which is] here figured [pls. 25, 26] are merely those of appropriate size and proportions, and, while some of the bones may have belonged to a single individual, there is nothing amounting to proof, and the majority certainly did not, because of the lack of precise fitting of the facets. The crocodile bones are somewhat

of sorting out individuals, and that they would be of little value for this purpose. In fact, the assorting depended partly upon the skeletons' being found for the most part associated and partly articulated, partly upon the precise fitting of the articular facets, which, in the majority of the joints, provide quite unmistakable evidence, as no two individuals ever fit together precisely. A third criterion is the pairing of bones; as many individual peculiarities are symmetrical on right and left sides.

Appropriate size and proportions, such as an elaborate system of measurements can verify, but which are far more readily and surely observed by a trained eye, give probable, or possible, but not certain associations. In the series of *Moropus* skeletons as finally associated the two grades of evidence were carefully distinguished. (W. D. M.)

better associated, one skull having a series of vertebrae articulated and a number of limb and foot bones probably belonging to the same individual. But for the most part these remains also are isolated bones.

There is no known association of individuals in the less common types, and the specimens are more fragmentary. Of *Mesocnus* we have a half skull, several rami of lower jaws, and many teeth, and have referred to this genus a number of limb bones for reasons stated in the discussion of the genus. Of *Acratocnus*¹ there are but a single jaw, a few teeth, and a humerus provisionally referred; of *Microcnus*, two incomplete jaws and certain provisionally referred foot bones. *Geocapromys* is represented by a number of fragmentary jaws and *Nesophontes* by a single lower jaw.

¹ *Miocnus* in Matthew's original manuscript. (C. P. C.)

The large *Testudo* is represented by many plates, parts of the plastron, and a few bones of the skeleton; its thin and fragile character has prevented the preservation of complete shells. The terrapin is about equally common and is represented by incomplete carapace, portions of plastra, and many separate plates. The remaining material is all equally fragmentary.

With a few exceptions, therefore, the Ciego Montero collection consists of dissociated bones and fragments of an indefinite number of individuals. Some of the associations made are provisional and doubtful, as is indicated in the detailed descriptions.

The Casimba collection is very similar in type to the collection from Ciego Montero, but much smaller in amount and somewhat more fragmentary. On account of the larger variety of species represented in it, a number of the types are derived from this locality.

SYSTEMATICS¹

(C. P. C.)

ORDER **EDENTATA** CUVIER, 1798

SUBORDER **XENARTHRA** COPE, 1889

INFRAORDER **PILOSA** FLOWER, 1883

SUPERFAMILY **MEGATHERIOIDEA** CABRERA,
1929

FAMILY **MEGALONYCHIDAE** ZITTEL, 1892

SUBFAMILY **MEGALOCNINAE** KRAGLIEVICH,
1923

MEGALOCNUS LEIDY, 1868

Megalocnus LEIDY, 1868, p. 180. DE LA TORRE,
1910a, 1910b. PAULA COUTO, 1956, p. 424.

Megalonyx (*Myomorphus*) POMEL, 1868a, p.
665; 1868b, p. 850. DE LA TORRE, 1910a, 1910b.
PAULA COUTO, 1956, p. 424.

Megalocnusus AMEGHINO, 1881, p. 303 (invalid
emendation or misspelling). PAULA COUTO, 1956,
p. 424.

Megalonyx LYDEKKER, 1887, p. 111 (including
"*Megalocnusus*" = *Myomorphus*), nec Harlan, 1825.

Megalonyx (*Megalocnusus*), ZITTEL, 1894, p. 136.

Parocnus MILLER, 1930, in part (?), PAULA
COUTO, 1955, in Hoffstetter, p. 101; 1956, p. 424.

GENOTYPE

Megalocnus rodens Leidy, 1868.

DISTRIBUTION

Pleistocene. Cuba, ?Haiti.

DIAGNOSIS

(W. D. M.)

Teeth ⁵/₄, the first upper and lower pair enlarged and spaced as in *Megalonyx*, but approximated medially, flattened into a scalpriform type, broadly convex anteriorly, concave posteriorly; the cheek teeth like those of *Megalonyx* but longer; palate greatly depressed in relation to the basicranial axis, much as in the Glyptodontia [Glyptodontidae].

Condyles much elevated above lower tooth row; anterior border of coronoid between second and third molars.

Limb bones slender as in Santa Cruz gravigrades [Santacruzean megatherioids].

¹ The suprageneric placing of the Cuban sloths is discussed on page 47. (C. P. C.)

Humerus with large entepicondylar foramen. Manus as in Santa Cruz gravigrades [Santacruzean megatherioids], but metacarpals less differentiated, and unguals long, slender, comparatively straight, and but little compressed.

DISCUSSION

This genus is sharply distinguished from any of the continental gravigrades [megatherioids] by the peculiar specialization of the front teeth and the no less striking peculiarities in the form of the skull.

The front teeth suggested to the original describers, Leidy and Pomel, the analogy with rodents which is implied in the scientific names given by both writers. The peculiar form of the skull, the plane of the palate at a considerable angle to the basicranial axis and much below it, is paralleled (although not closely) in the glyptodonts and in *Megatherium* [and *Eremotherium*] among the ground sloths. In conformity with this peculiar adaptation of the skull, the lower jaw has the condyle set far above the tooth level, the coronoid process springing from a point opposite the middle of the cheek teeth, the inferior border strongly convex as in *Megatherium*, and the rodent-like front teeth set close together, separated by a considerable diastema from the cheek teeth.

The cheek teeth are much like those of *Megalonyx* and but little changed from those of the primitive Megalonychidae of the Santa Cruz [Santacruzean], except for their considerably greater length. This has necessitated also a deepening of the jaw beneath them.

The skeleton is most like that of the Santa Cruz [Santacruzean] Megalonychidae, somewhat more massive, but not nearly so much so as in *Megalonyx*. The feet are also rather primitive. The pelvis has a very broad ilium; the tail was rather short. Limb and foot characters much as in *Hapalops* and its allies, but ungual phalanges elongate.

DENTITION: The teeth are rootless and enamel-less, as usual in the Gravigrada [Megatherioidea], but are of unusual length. The molars are very like those of *Megalonyx*,

TABLE 2
MEASUREMENTS (IN MILLIMETERS) OF THE SKULL OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49955
Length from anterior margin of maxillaries to posterior end of occipital condyles	287a	275a
Greatest transverse diameter of braincase	88a	88
Bi-zygomatic width	158	155a
Width between post-frontal processes	80a	80a
Length from posterior end of palatine suture to basion	117	115a
Length from anterior end of intermaxillary suture to posterior end of palatine suture	130a	122a
Greatest width across occipital condyles	65.5	65.5
Transverse diameter of foramen magnum	33a	30
Dorsoventral diameter of foramen magnum	24	22
Width between external borders of M ⁴	59	59
Diastema between M ¹ and M ²	68	61.5
Height from basioccipital plane to dorsal plane	85	86
Height from palatine plane to dorsal plane	130	136
Greatest width across occipital region	100	108
Dorsoventral height of occipital region	68	66.3

TABLE 3
MEASUREMENTS (IN MILLIMETERS) OF THE MANDIBLE OF *Megalocnus rodens rodens*

	Length from Anterior End of Symphysis to Posterior End of Angular Process (Gonion)	Length from Anterior End of Symphysis to Posterior End of Condyle	Height under M ₁	Height of Posterior End of Symphysis	Width Between Centers of Condylar Surfaces	Thickness under M ¹	Thickness Between Symphysis and External Border of Alveolus of Canine Tooth	Width of Condyle
A.M.N.H. No. 16876	206a	215a	66.5	55	124	37	29	40a
A.M.N.H. No. 49956	221a	215a	68.5	59	102	38.5	33	46
A.M.N.H. No. 49957	—	—	74	62.2	—	35.5	30	—
A.M.N.H. No. 49958	—	—	67	53.5	—	30	27.5	—
A.M.N.H. No. 49959	—	—	64.5	55	—	33.5	30	—
A.M.N.H. No. 49960	—	—	64a	55	—	31	—	—
A.M.N.H. No. 49961	—	—	—	52	—	31	27.5	—
A.M.N.H. No. 49963	—	—	70	61	—	34.2	29	—
A.M.N.H. No. 49964	—	—	62	59	—	30.5	27	—
A.M.N.H. No. 49965	—	—	—	65.5	—	37	23.5	—
A.M.N.H. No. 49966	—	—	67	68	—	37	—	—
A.M.N.H. No. 49967	—	—	66a	58	—	36	30	—
M.P.U.H. No. 1680	200a	205	68	60	—	35	31	37
M.P.U.H. No. 1681	—	—	—	56	—	34.5	29.5	—
M.P.U.H. No. 1682	—	—	—	62	—	33	25	—
M.P.U.H. No. 1683	—	—	—	59	—	36	30	—
M.P.U.H. No. 1684	—	—	66	59	—	33	—	—
M.P.U.H. No. 1685	—	—	67	62a	—	33.5	—	—
M.P.U.H. No. 1686	—	—	64	—	—	—	—	—
M.P.U.H. No. 1687	—	—	—	57	—	36	28	—
M.N.R.J. No. 2011-V	195a	198	66	55.5	—	32	32	37
M.N.R.J. No. 2012-V	—	—	64.5	57	—	33	29	—
M.N.R.J. No. 2013-V	—	—	63.5	—	—	33.5	—	—
M.N.R.J. No. 2082-V	—	—	59	—	—	30	—	—

not far removed from the primitive transversely oval type of the Miocene genera; but the front teeth are more specialized, although obviously reminiscent of those of *Megalonyx*.

The anterior upper tooth or "canine-molar," to use Cope's term (the tooth being neither a canine nor a molar [herein called "caniniform" tooth, M_1^1]), is strongly curved in section, it is broad transversely, the anterior (antero-external) face broadly convex towards the external border, a broad shallow groove separating this from the antero-internal angle. The postero-internal face is flat or slightly concave, with a similar broad shallow groove near the middle. The inner face is quite short and flat. All three faces carry on the surface of the dentine a series of sharply defined longitudinal ridges separated by shallow grooves, but the number and spacing of these ridges are variable; they are more crowded near the three solid angles; the number averages six or more on the postero-internal, three or four on the internal. They are obscured in the perfectly preserved teeth by the cement, which is striated longitudinally with numerous fine parallel grooves. The tooth is at the front of the maxilla as in *Euchloeops* and *Megalonyx*, separated from the cheek teeth by a diastema approximately equal to the length of the cheek tooth rows, considerably longer relatively than in either genus. The canines ["caniniform" teeth] are set much more transversely than in *Megalonyx* and are closer together than in either *Megalonyx* or *Euchloeops*, both absolutely and relatively to the width of the palate. The space between the two canines ["caniniform" teeth] is one-sixth more than the major diameter of one; in *Megalonyx* it is about one-half more, in *Euchloeops*, two to three times as much. The width across the canines ["caniniform" teeth] is slightly greater than the width across the palate (one-eighth in one specimen, one-twentieth in another); in *Megalonyx* (Leidy's skull) and *Euchloeops* it is one-fourth greater.

As in both the other genera, the tooth is set at the front of the maxilla, the whole anterior end of which is extended and modified into a sheath for the canine ["caniniform" tooth], but this is carried further than in either genus and shows a marked analogy to

TABLE 4
MEASUREMENTS (IN MILLIMETERS) OF THE UPPER
TEETH OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49955
M^1		
L	10.9	—
W	23.3	20.5
M^2		
L	12.8	16a
W	19	20.7a
M^3		
L	15	17.5
W	22.2	20.2
M^4		
L	17.5	17.3
W	20	19.8
M^5		
L	12	11.5a
W	16	17a
Length from anterior border of M^2 to posterior border of M^5	68.5	67.5a

the premaxilla of a rodent, the sheath projecting forward considerably in advance of the tips of the nasals or the lateral margins of the anterior nares, and also downward considerably below the level of the palatine plane. *Megalonyx* is less specialized in these particulars; *Euchloeops*, still less so.

Of the four cheek teeth the second [M^3] and third [M^4] are larger than the first [M^2] and fourth [M^5]. The first [M^2] is trapezoidal, almost rectangular in outline, suggesting the anterior cheek teeth of *Hapalops* but more decidedly quadrate and obliquely set, the long diameter antero-external to postero-internal. The second and third are in form intermediate between those of *Megalonyx* and those of the scelidotherine group, *Nematherium*, *Analcitherium*, and *Analcimorphus*, of the Santa Cruz [Santacruzean]. The internal face is uniformly convex, continuous with the anterior face, the postero-external face broad and slightly concave, the external face quite narrow; the cross section of the tooth is not far from a semicircle. The last tooth is smaller, subtrigonal, with the acute angle facing inward, the antero-external angle broadly rounded, and the postero-ex-

TABLE 5
MEASUREMENTS (IN MILLIMETERS) OF THE LOWER TEETH OF *Megalocnus rodens rodens*

	M ₁		M ₂		M ₃		M ₄	
	W	L	W	L	W	L	W	L
A.M.N.H. No. 16876	24a	9a	25	16.2	23.8	16	23	23
A.M.N.H. No. 49957	26.6	11	22	15.8	23.2	15.8	21	22
A.M.N.H. No. 49958	—	—	21	14.5	23	14.8	20.5	21
A.M.N.H. No. 49959	24a	9a	21	14.8	22.5	16	22	21
A.M.N.H. No. 49960	20a	8a	19	14.2	20.5	15.5	20	22
A.M.N.H. No. 49961	20a	8a	18.5	15	19	15	18	20
A.M.N.H. No. 49963	22a	9a	22.2	15	23	15.5	22	21
A.M.N.H. No. 49964	19a	8a	18	13.5	19.5	14.5	18.5	19
A.M.N.H. No. 49965	20.5	9	22	15.2	23	16	20	22.2
A.M.N.H. No. 49966	—	—	19	13.9	20	14.8	18.8	20.2
A.M.N.H. No. 49967	—	—	22a	14a	21.2	15.5	19.5	20
M.P.U.H. No. 1680	20a	9a	22	16	22.8	15.6	21	22
M.P.U.H. No. 1681	20a	9a	20a	13a	21a	15a	17.8	19.3
M.P.U.H. No. 1682	21a	8a	22.5	15	23.5	15	21.8	20
M.P.U.H. No. 1683	23a	9a	20.5	14	22.5	15	23.2	21
M.P.U.H. No. 1684	—	—	19.8	14.5	21.2	15	20a	20a
M.P.U.H. No. 1685	—	—	22.5	14	22	14	21.5a	22a
M.P.U.H. No. 1686	—	—	—	—	21a	15a	21.3	20.5
M.P.U.H. No. 1687	20a	9a	20a	15a	19.8	15.7	—	—
M.P.U.H. No. 1688	22.5	8.2	20.8	14.7	—	—	—	—
M.N.R.J. No. 2011-V	24a	8a	21a	15.3	23	15.8	20a	21a
M.N.R.J. No. 2012-V	21	9.2	21.5	14	22	14.5	21.1	19
M.N.R.J. No. 2013-V	—	—	20.7	15	21a	16a	19.2	19.3
M.N.R.J. No. 2014-V	—	—	—	—	22.5	17	23.8	22
M.N.R.J. No. 2015-V	—	—	—	—	19.5	15.2	18.8	20.2

ternal angle of about 80 degrees; the posterior face is flat.

None of the Santa Cruz [Santacruzean] genera correspond very well to *Megalocnus* in

TABLE 6
MEASUREMENTS (IN MILLIMETERS) OF THE
SCAPULA OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49968	M.P.U.H. No. 1689
Length	170	175a	—
Length of base of spine	124	130a	—
Length of glen- oid cavity	46	46	45
Width	180a	—	—
Width of ante- rior fossa	74a	—	—
Width of pos- terior fossa	79a	—	—
Width of glen- oid cavity	32a	26	33

their molar type. The rectangular M² [M³] is approached in *Hapalops*, the oblique set of the teeth and the characteristic form of M² [M³] and M³ [M⁴] are suggestive of the Miocene scelidotheres, and the last molar is entirely like that of *Megalonyx* and *Megalonychotherium*, but hardly approached elsewhere. All in all, *Megalonyx* is decidedly the nearest relative.

In the lower jaw the first tooth [M₁] is very suggestive in its position and relations of the scalpriform incisor of rodents. The pair of front teeth is approximated more than in any other edentate (*Peltephilus* excepted). The space between them is usually less than the major axis of one tooth. The cross section of the tooth is a meniscus, the antero-external side convex, the postero-internal broadly concave, both sides longitudinally ribbed with sharply defined ridges and shallow valleys on the surface of the dentine, the ridges on the outer side usually eight or 10, on the inner side limited to one or more median and two or three next to the margin. The curva-

ture of the tooth is slight, much less than in the first upper tooth.

The lower tooth bites behind the upper with an oblique shearing motion, the plane of the shear being at 45 degrees to the palatal plane, but also pitched somewhat outward and downward.

The anterior end of the jaw is modified into a sheath for the front tooth, giving an aspect very suggestive of a rodent jaw. The diastema is not so long as in the upper jaw; it is somewhat over half of the length of the row of lower cheek teeth, and from one-third to twice greater than the major diameter of the front tooth. The three cheek teeth are much like those of *Megalonyx*.

The three lower cheek teeth are most like those of *Megalonyx*, but suggestive of the Miocene scelidotheres in a tendency to obliquely set subtrigonal form. The form of the first two [M_{2-3}] is between transversely rectangular and trigonal, the inner side being hardly more than a broadly rounded solid angle. The flat anterior side faces progressively more internal from the first [M_2] to the third [M_4] tooth; the outer face, obscurely grooved, is progressively longer. The posterior and internal faces of the last molar [M_4] are continuous in a broad, strongly convex, postero-internal border, almost semi-circular. These teeth differ but little from those of *Megalonyx*, the oblique setting, and the relatively larger last molar with external face flatter and wider, antero-external angle accentuated, being the most notable points.

The peculiar longitudinal grooving or fluting of the front teeth in *Megalocnus* is still more prominent in the upper "canines" ["caniniform" teeth] of *Mesocnus*, obscurely seen in the second upper tooth and in the lower "canine" ["caniniform" tooth] of that genus. In *Miocnus* [*Acratocnus*] it is entirely absent in the upper teeth, obscurely seen in the lower canines ["caniniform" teeth]. I have no evidence of the conditions in *Mesocnus*. The genus *Ereptodon* Leidy was founded upon a lower tusk distinguished from *Megalonyx* by this character.¹ It is certainly not

present in any of the *Megalonyx* canines ["caniniform" teeth] that I have examined, nor have I seen any clear indications of it in any of the Pampean or Santa Cruz [Santacruzian] ground sloths in our collections. It is usually obscured by the cement covering and can then be recognized only upon the wearing surface, so that it might readily pass unnoticed.

SKULL: The most noticeable peculiarities in general proportions are the great depression of the basifacial plane relative to that of the basicranial region, and the rodent-like adaptation of the front teeth. The first is paralleled in *Megatherium* and the glyptodonts, but the front teeth in these genera have been added to the molar series, while in *Megalocnus* they are differentiated as incisor-like teeth. Neither *Megalonyx* nor any of the Santa Cruz [Santacruzian] genera nor the later mylodonts show anything of this peculiar depression of the basifacial plane. It is also noticeable in the Proboscidea, in the arsinotheres, and in *Pyrotherium*, and in the latter two, although not in the Proboscidea, it is accompanied by a bending upward of the basifacial upon the basicranial axis. In all these instances the teeth are very long-rooted, and the skull is short; but these cannot be the only conditioning factors.

The remarkably rodent-like specialization of the front teeth amounts to something more than mere diprotodonty. The teeth are considerably approximated, their form is much changed, broadened out into a wide crescentic form curiously like a very broad incisor of rodent type, and—this is the most striking resemblance—the entire anterior end of maxilla and mandible is converted into a projecting sheath to contain the teeth.

The wear of these teeth, however, is not at all like the wear of rodent incisors. They strike with a shearing action as do the tusks of other edentates or of pigs and peccaries. The wearing surfaces are parallel in upper and lower teeth, and thus wholly unlike the scalprine wear of the rodent molars. This fact is not conditioned by the absence of enamel, for the hard dentinal layer might well subserve the same function, nor by the transverse condyle which limits the fore-and-aft movement of the jaw, for the peculiar flat top of the condyle and absence of postglenoid process on the skull are evidently

¹ The individual morphological variation among the Edentata is sometimes so great that such a character as that used by Leidy to distinguish *Ereptodon* from *Megalonyx* is certainly very doubtful, probably invalid. (C. P. C.)

adaptive changes designed to permit just such a fore-and-aft motion.

Directly associated with the great depression of the basifacial plane is the extreme elevation of the jaw condyle, drawing with it the angle, and very much overtopping the coronoid process.

SKULL AND JAWS: The skull is moderately convex in superior outline, the postorbital crests are distinct and come close together over the parietals but are not united into a sagittal crest; they swing apart again opposite the posterior roots of the zygomatic and curve around to unite with the upper margin of the arch. The area enclosed by these crests serving for attachment of the temporal muscle is sharply differentiated in surface markings from the adjoining parts of the top of the skull. It is covered by a network of anastomosing raised lines most prominent towards the margin and fading out on the sides of the skull.

The muzzle is cylindrical, scarcely constricted, nearly as wide as the postorbital portion. The skull is slightly broader at the orbits and again widens out a little at the arches. The occiput is broad and low; the top of the skull in this region is smooth and round, without trace of crests, cut off, as it were, at an angle to form the rugose, backward-facing occiput. The condyles are large and face downward and backward. The basioccipital plate seems to have been short and narrow; the mastoid processes are moderately prominent. The zygomatic arches are of moderate width, the glenoid articulation being a flat plane curved downward on the inner side. The pterygoid region is insufficiently preserved for description. The palate is extremely narrow, especially anteriorly, where its width is about half of that of the first molar. It is perforated by numerous foramina (for the blood supply of the gums) and posteriorly it curves upward opposite M³ [M⁴] to meet the margin of the posterior nares. Anteriorly the palate extends forward to the incisiform teeth with a form and relations closely mimicking those of the rodents. Between the front teeth it is deeply notched by the palatine foramina, which are entirely open anteriorly; at the median line it is grooved by a broad longitudinal gutter, and sharply turned upward at the anterior end.

Nothing is known of the premaxillae; if ossified at all, they must have been separate unattached bones, as the anterior margin of the maxilla is so incomplete.

The jugals are rather loosely sutured and, while many specimens are preserved separately, only one is complete. The bone as a whole is slender and reduced, the ascendant process, much as in *Choloepus*, extended into a long slender spine, which appears to have turned upward and somewhat backward in a direction more or less parallel to the upper border of the zygomatic process of the squamosal, but not meeting or even closely approximating it. The descending process of the jugal, on the other hand, unlike that of *Choloepus*, is reduced to a short, thin, flat plate with waved or crenate border, quite out of contact or close approach to the zygomatic process of the squamosal. Owing to the much depressed position of the palate and front of skull in relation to the cranial portion, the ascending process of the jugal projects for the most part straight upward, and the effect is a very curious one, for it gives the impression of projecting into or across the orbit, although really behind it.

(C. P. C.)

The jugal is much less expanded backward than in the Santacruzean (Miocene) forms, such as *Hapalops*, *Schismotherium*, and *Hyperleptus*, or than in the continental Pleistocene genus *Nothrotherium*. The zygomatic arch is, therefore, widely open, this condition being in accordance with the width between the postorbital crests and with the absence of the sagittal crest. The structure is very different from that of *Megalonyx*, the zygomatic arch of which is completely closed, and in which the postorbital crests of the frontal join at the midline to form a strong sagittal crest. The figure of the skull of *Megalocnus* in Scott (1937, p. 664, fig. 396) is erroneous in showing a closed zygomatic arch like that of *Megalonyx*. The descending process of the jugal somewhat resembles that of the Miocene genus *Schismotherium* and the processes of some Pleistocene Mylodontidae, but differs very much from that of *Megalonyx*.

SCAPULAR GIRDLE: The scapula is short and very like that of *Paramylodon harlani* in its shape. The spine is high, particularly in

TABLE 7
MEASUREMENTS (IN MILLIMETERS) OF THE HUMERUS OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49975	A.M.N.H. No. 49995	A.M.N.H. No. 49969	A.M.N.H. No. 49970	M.P.U.H. No. 1690	M.N.R.J. No. 2031-V
Length	267	278	235	285	—	258	—
Width of proximal end	71	73	60.5	80	—	66.8	—
Length of head	42	43	35.4	44.2	—	37a	—
Width of head	42	44.5	34	39.5	—	—	—
Width of shaft	47	48	40a	54	—	43	46
Width of distal end	106a	108.5a	98a	113	111	97	106
Width of trochlea	58	66	53	66	64	56a	57
Depth of trochlea	28	33	25	29.5	29.7	29.8	28
Length of greater trochanter	26	29.5	23	23.8	—	23a	—
Width of lesser trochanter	28	33	28	36.5	—	—	—
Width of bicipital groove	16a	20	13	22.5	—	—	—

its ventral part, becoming progressively lower towards the dorsal end, where its anterior and posterior borders diverge dorsally towards the superior border of the scapula. The prescapular fossa is larger than the postscapular, as in the Miocene genera (e.g., *Hapalops*), in *Nothrotherium*, *Megatherium*, and *Paramylodon*, while in *Megalonyx*, according to Leidy (1855, p. 25), the two fossae are nearly equal in extension, as in *Glossotherium* and others. The acromion is prolonged forward and united with the coracoid to form a relatively strong bridge between the scapular spine and the coracoid process. This bony bridge is about at the same level as the glenoid cavity, as in *Megalonyx*. The coracoid process is large and broad, and rugose inferiorly. The coraco-scapular foramen is commonly small, slightly above and anterior to the glenoid cavity, as in *Megalonyx*. The ridge that limits the postscapular fossa posteriorly is prominent, broad inferiorly and sharp dorsally. The glenoid cavity is ovate or ellipsoidal in outline, its greater diameter longitudinal, and is shallow or moderately deep, strongly concave anteroposteriorly and flat or slightly concave transversely. The external face of the scapula is somewhat convex, the internal one being somewhat concave.

The clavicle is a simple and tiny element. It is almost flat, curved downward, and different from that of *Megalonyx*. Its upper and

lower surfaces are broad, being almost equally wide through the whole extension of the bone. The upper surface is gently concave longitudinally, and the lower surface is slightly convex. The articular facet for the acromion is ovate and more or less corrugated. The sternal head is slightly expanded anteroposteriorly, broad, and subovate.

(W. D. M.)

FORELIMB: The humerus is remarkably like that of *Megalonyx jeffersoni* as figured by Leidy [1855], in spite of its smaller size. The dimensions are about two-thirds of those of

TABLE 8
MEASUREMENTS (IN MILLIMETERS) OF THE RADIUS OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49973	A.M.N.H. No. 49974
Length	220a	220	—
Width of proximal end	28.8	25.8	27.5
Length of proximal end	23.5	21	21a
Width of neck	19.8	18.8	17
Width of shaft	34.5a	31.5	38.8
Width of distal end	40.5a	45	—
Length of distal end	34.5a	32	—

TABLE 9
MEASUREMENTS (IN MILLIMETERS) OF THE ULNA OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49971	A.M.N.H. No. 49972	M.P.U.H. No. 1693
Length	252	230	—	—
Length of sigmoid notch	40a	40.5	34.5	46.8
Greater length of olecranon	44a	34	45.5	49.8
Lesser length of olecranon	35a	34.2	34.2	46.2
Width of olecranon	35a	35	35.2	45
Length of shaft	36	26	28	—
Width of shaft	15	15	13	15a
Width of sigmoid notch	48a	40.2	48	47
Length of distal end	20a	18a	—	—
Width of distal end	22a	24	—	—

Megalonyx. The head is not so convex nor so circular in outline, facing more directly proximad and the facet being more extended into the valley between the head and the external trochanter. Both trochanters are more prominent laterally, especially the internal one which projects directly inward nearly as far as the diameter of the head; the outer trochanter is more constricted than in *Megalonyx* but not nearly so high or wide. In the Pleistocene genus the outer trochanter is as high as the head; in *Megalocnus* it is much below it. The deltoid and pectoral crests are wholly separate. The pectoral crest is narrow, thin, and prominent, especially towards its distal end, a little below the middle of the shaft; it is situated upon the anterior surface of the shaft, a little towards the inner side. The deltoid crest is much heavier and more prominent, situated on the outer border of the shaft, except its lower end, which bends up over the anterior surface, fading away in the lower part directly distal to the lower end of the pectoral crest but separated from it by about 15 mm. The supinator crest is about as prominent as in *Megalonyx*, and has much the same form. The entepicondylar foramen is relatively much larger than in *Megalonyx*, the bridge longer and more slender. . . . The radial [distal] facet is smaller, less condyloid, its external margin reduced, while the ulnar facet is much larger and more extended towards the inner side beneath the base of the entepicondyle. The anconeal fossa is obsolete, as in *Megalonyx*.

In the Santa Cruz [Santacruzian] *Mega-*

lonychidae the tuberosities, especially the internal one, are less prominent, the shaft is less elongate, the pectoral and deltoid crests are united distally, and the deltoid crest is anterior, the pectoral crest being less prominent and more internal. The epicondyles and supinator crest are less flaring; the ulnar facet is less extended internally. In *Myiodon* the humerus is much shorter and more robust, the inner tuberosity is somewhat smaller, but the external tuberosity is much larger and more massive, the deltoid crest is further shortened to a rugose, transversely eche-loned series of short, irregular, longitudinal crests, extending from the external crest along the proximal part of the shaft across the front about the middle of the bone; the pectoral crest is more widely separated, but obsolete. The distal end of the humerus in *Myiodon* is more flared but less flattened, the epicondyles are more prominent, there is no entepicondylar bridge, the ulnar facet is deepened into a more marked trochlea, and the anconeal fossa is distinct though shallow. In *Scelidotherium* the humerus is much as in *Myiodon*, but somewhat shorter and more robust, and the entepicondylar foramen is present in certain species, absent in others.¹

The radius is nearly as long as the humerus, with small head and flattened shaft, somewhat convex anteriorly and with an extended internal crest, most prominent at the second

¹ Present in skeleton of *S. "cuvieri"* (= *leptocephalum*) in the American Museum; absent in *S. magnum* figured by Winge. (W. D. M.)

fifth of the shaft. The bicipital tubercle is prominent, the head is oval, relatively small and weak-looking, the distal end is only moderately and quite gradually expanded, and the distal facet rather uniformly concave, with no marked styloid process.

The ulna is also long and slender, smaller below and larger proximally, quite closely reversing the proportions of the radius. The olecranon is variably developed in different individuals but is always quite weak and short, hardly more than a knob, less prominent than in most Carnivora and in marked contrast to that of the mylodonts. The shaft is trihedral, much wider than deep towards the proximal end, more isohedral near the distal end.

The ulna and radius of *Megalonyx* are of similar type, but considerably more robust, especially the ulnar shaft. The bicipital tubercle takes the form of a long posterior crest "almost two inches long," according to Leidy.

In the Santa Cruz megalonychids [Santacruzean Megalonychidae] the ulna and radius are much as in *Megalocnus*, but less elongate; the shaft of the radius is more curved, convex anteriorly and externally, and the distal facet is less deeply excavated. The length of the shaft is greater in *Eucholoeops* than in *Hapalops*. In *Myiodon* and *Scelidotherrium* the radius and ulna are very much shorter, with straight robust shafts, the ulna with a long and massive olecranon.

The manus of *Megalocnus* is of a very primitive and unspecialized type, much like the corresponding parts of the Santa Cruz [Santacruzean] Megalonychidae. The carpal bones appear to be all separate. The metacarpals are more uniform in proportions than in *Hapalops*, but, as in all the genera, there is a tendency for the inner digits to be short and stout and for the outer digits, IV and V, to be differentiated from the rest by greater length and more slender, rounded shafts.

The third metacarpal has about the same relative proportions as in *Megalonyx*, with about half of its lineal dimensions. Its distal crest is symmetrical and much less prominent than in *Megalonyx*, where it is shifted over towards the inner side of the foot. It is decidedly more robust than in *Hapalops*, but agrees very nearly with that of some of the

Santa Cruz [Santacruzean] ground sloths.

The ungual phalanges of the forefoot are intermediate in character between the primitive, strongly compressed, curved, and crested type common to all the Santa Cruz [Santacruzean] ground sloths, and the long, nearly straight, uncompressed, heavily hooded type of the large Pleistocene ground sloths. The ungual of *Megalocnus* is long, moderately curved, trihedral, with flat under surface and moderately crested upper border, the height in cross section a little greater than the width, the tip of the phalanx deeply fissured, as in the Santa Cruz [Santacruzean] types.

(C. P. C.)

PELVIC GIRDLE AND SACRUM: The innominate bone is moderately expanded anteroposteriorly. The ilium and pubis are almost vertical, the inferior angle between their planes and the sacrum being about 140 degrees. The ilium is more or less rounded in outline, much less expanded laterally than in *Nothrotherium*, and, contrary to what is seen in the Miocene forms, especially, and in *Nothrotherium*, it does not extend in front of the sacrum, its anterior end coinciding more or less with that of the sacrum. The acetabular border is directed almost downward, rather than laterally as in the Miocene genera. The pubis and ischium are known only by their proximal ends. The pubis seems to have been elongate, slender, and transversely flattened, at least where it is widest. The ischium was certainly short anteroposteriorly and flat transversely. The foramen obturatorium seems to have been very large, perhaps as large as in the Miocene forms. Its greater diameter was probably vertical. The sacro-ischial foramen is relatively large and subovate, its longer axis being almost vertical. The acetabulum is large, transversely ovate in outline, strongly concave, with salient borders; the sulcus for the round ligament is relatively narrow, much more reduced than in the Miocene relatives, and proportionally about as large as in *Nothrotherium*.

As is the case with all the Xenarthra, the innominate bone is fused with the sacrum, which is formed by at least seven vertebrae, the last lumbar vertebra probably being

TABLE 10
MEASUREMENTS (IN MILLIMETERS) OF THE PELVIS OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49976	M.C.Z. (no number)
Greatest transverse width across ilia	546a	462a	480a
Dorsoventral diameter	270a	222	204
Transverse width	253a	228a	224a
Length of synsacrum	225a	225	264a
Width of pelvic opening	66a	—	—
Diameter of acetabulum	48a	44	41.5
Greatest diameter within acetabulum	47a	47	50
Longitudinal diameter of sacro-ischial foramen	52	55.5	54
Least distance from inferior border of sacroischial foramen to external border of acetabulum	82a	82	94
Greatest diameter of obturator foramen	96	—	—

sometimes more or less fused with the first sacral, at least by its neural arch. The number of sacral vertebrae is, therefore, more than the limit observed in the Miocene genera and in *Nothrotherium*, the sacra of which are generally formed by the fusion of five vertebrae. This number is also five in *Glossotherium robustum*, but it is greater in *Paramylodon harlani*, with nine vertebrae in the sacrum.

(W. D. M.)

HIND LIMB: The femur is of about the same length as the humerus and only a little more robust; there is not the contrast in proportions shown by some of the ground sloths, the difference being less than in *Megalonyx*, which has a relatively shorter but much more massive femur. The femur in *Megalocnus* is nearer to that of the Santa Cruz [San-

tacruzean] ground sloths, but very materially different from any one of them. The head presents somewhat more inwardly than in *Megalonyx* and is less sessile; the pit for the round ligament forms a deep notch on the posterior border of the condyle, a condition intermediate between that in the Miocene and Pleistocene genera of Megalonychidae and similar to that seen in *Myiodon* and others. The greater trochanter is more prominent than in *Megalonyx*, rising almost to the height of the head and separated from it by a broad notch, about as deep as in *Hapalops*, but the rugosity is much larger and heavier than in that genus, extending obliquely down the outer and anterior aspects to a point opposite the second trochanter.

The second trochanter is quite as much reduced as in *Megalonyx*, much less prominent than in the Santa Cruz [Santacruzean]

TABLE 11
MEASUREMENTS (IN MILLIMETERS) OF THE FEMUR OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49978	A.M.N.H. No. 49977	M.N.R.J. No. 2034-V
Length	269a	286	281	286a
Width of proximal end	107.4a	108	118a	110a
Width of head	48.9	49.5	48	—
Width of distal epiphysis	88.2	108.5a	94.5	98
Width of shaft	68	60	69.8	51
Width of trochlea	38.1	41.4a	38.5	40
Width of condyles	63.8	94.5	75.5	85
Width of fossa intercondyloidea	12a	17.8	14.3	15

genera; it makes a very sharply defined rugosity, but does not project inward enough to modify the sweep of the internal border in any marked degree. The third trochanter is prominent and sharply cut off distally, but proximally it continues as a compressed, flattened ridge with thickened border to the lower end of the trochanter major, where its thickened border is further expanded into the rugosity of the greater trochanter. The digital fossa is of moderate size for a ground sloth, less reduced than in *Megalonyx*, more than in the Miocene genera.

Below the third trochanter, that is to say, in the lower two-fifths of the femur, its form is suddenly changed, the shaft losing the broad, flat proportions usual in the group, and becoming abruptly narrowed and deepened to a more rounded, oval form with much deeper condyles than in any of the genera with which comparison has been made. These at least are the proportions shown in the femur selected for figuring [pl. 20], but other less perfectly preserved femora show an extraordinary range of individual variation, the other extreme having the distal end and distal part of the shaft broad and flattened in the usual ground sloth fashion, the outer border continued in a wide, thin margin down to the external epicondyle and the condyles as much flattened as in *Megalonyx*. Other femora referable to *Megalocnus* by size are intermediate in these characters. The condylar facets are united with the rotular facet by very narrow isthmuses, not separate as in *Megalonyx*, nor extensively united as in *Mylodon* and the Santa Cruz [Santacruzean] genera of Megalonychidae.

The rotular groove in the *Megalocnus* fe-

mur figured is high and prominent, almost as it is in the glyptodonts, but in other specimens it is much flattened, approaching the type of the Santa Cruz [Santacruzean] Megalonychidae.

The tibia is about two-thirds of the length of that of *Megalonyx*, and more slenderly proportioned, especially as to its proximal and distal ends. The cnemial crest is by no means so high or prominent, and the "spine" appears more distinctly between the femoral facets. Of these the inner is relatively larger, more rounded, and concave, and the outer is rather smaller, more trihedral, and approximates the inner facet quite closely, while in *Megalonyx* they are wide apart, subequal in size, and the outer is quite circular in form. The fibular facet presents much more distally than in *Megalonyx*, so far as can be judged from Leidy's figure.

The distal end of the tibia has the tripartite division of the facets seen in *Megalonyx*, but the proportions are different, the median division being the largest, while the inner division, which in *Megalonyx* constitutes about half of the facet, is here not more than a quarter. The depth anteroposteriorly of the facet is much greater than in *Megalonyx*, greater than in the Santa Cruz [Santacruzean] genera as figured by Scott. The supra-malleolar process on the inner side of the distal end of the shaft projects laterally as much as in *Megalonyx*, but does not reach down distally as far as the level of the facets, whereas in *Megalonyx* it extends considerably below them, and slightly so in *Hapalops* and other Santa Cruz [Santacruzean] genera. The characters of the tibia do not show any wide degree of variation in the specimens at hand;

TABLE 12
MEASUREMENTS (IN MILLIMETERS) OF THE TIBIA OF *Megalocnus rodens rodens*

	A.M.N.H. No. 16876	A.M.N.H. No. 49979
Length	182a	210
Length of proximal epiphysis	63.8a	68
Width of shaft	31.4a	38
Width of proximal epiphysis	70a	86.8
Width of distal epiphysis	60a	66.6
Length of distal epiphysis	45.5	49.5
Width of distal articular surface	43a	51.5

the peculiar anteroposterior depth of the distal facets and their proportions distinguish them from any of the Santa Cruz [Santacruzian] genera and no less from any of the Pleistocene forms.

The comparatively slender proportions of the femur and tibia of *Megalocnus* are most nearly approached by *Euchloloeps* among the Santa Cruz [Santacruzian] Megalonychidae; but *Prepothierium* approaches it more nearly in some constructive details, and the tibia and femur of *P. potens* are slightly larger than any of our *Megalocnus* bones. The tibia in *Megalocnus* is much less massive than in any of the Pleistocene genera except *Nothrotherium*; the mylodonts and *Megatherium* are very widely different.

The astragalus retains the primitive form of that of the Santa Cruz [Santacruzian] Megalonychidae with but little change, but is about twice as large lineally as the common Santa Cruz [Santacruzian] species. The principal difference is that the inner trochlea is somewhat more built up, and the upper concave portion of the head is somewhat deeper. These changes are carried much further in *Megalonyx*, along with a proportionate increase in size. The inner trochlear crest of the astragalus in *Megalonyx* is built up to equal the outer trochlea in height and exceed it in length, the concavity between being very slight, and the body taking on a considerable suggestion of the primitive proboscidean type; moreover, the concave upper part of the head is built up considerably further. There is no suggestion in the astragalus of *Megalocnus* of the unequal oblique development of the head which culminates in the peg-like external trochlea of the mylodonts and megatheriids. If, as seems probable, this obliquity is directly correlated with walking upon the outer side of the pes, it would appear that *Megalocnus* had no tendency to this gait, but walked upon the plantar surface of the pes.

The navicular is also very like that of the Santa Cruz [Santacruzian] ground sloths, except for a building up of its upper surface, increasing the depth and the relative size of the convex upper articulation with the astragalus.

The ungual phalanges of the hind foot are distinguished from those of the forefoot by their broader and more hoof-like character.

They are very long, gently curved, with broadly convex upper surface and flat under surface, the hood very moderately developed, and the tip flat and without any trace of median fissure. These phalanges are quite different from those of *Megalonyx*, nor do they resemble those of the mylodonts in any degree. A similar flattening of the dorsum is seen in some of the armadillos, but the claw is much shorter; in the glyptodonts it is still shorter and widened out into a completely hoof-like bone.

(W. D. M.)

Megalocnus rodens Leidy, 1868

"Mamífero . . . roedor . . . antediluviana" POEY, 1861 (*vide* de Castro, 1864, p. 58).

"Nuevo genero . . . del orden de los edentes" DE CASTRO, 1864, p. 96.

Megalocnus rodens LEIDY, 1868, p. 180.

Myomorphus cubensis POMEL, 1868a, p. 665.

(C. P. C.)

HOLOTYPE

Greater part of a mandible with the left M_{3-4} and right incisiform tooth (M_1) and M_{2-3} , presumably in the collections of the Madrid Museum. Collected by José Figueroa, 1861. Figured in de Castro, 1864.¹

LOCALITIES

Ciego Montero, near Cienfuegos; Casimba, Sierra de Jatibonico, Cuba.

HYPODIGM

Besides the type, the following specimens: A.M.N.H. Nos. 16876, a mounted composite skeleton; 49955, almost complete skull with right and left M^{3-4} ; 49956, almost complete mandible with right and left cheek teeth (M_{2-4}); 49957-49967, incomplete lower jaws with teeth; 49968, restored right scapula; 49969, 49970, complete and incomplete left humeri; 49971, 49972, right and partial left ulnae; 49973, 49974, complete and partial right radii; 49975, left humerus; 49976, almost complete pelvis; 49977, 49978, right and left femora; 49979, right tibia; 49980,

¹ Leidy's and Pomel's descriptions were both based on this specimen. Leidy based his description on de Castro's figures. Pomel had the specimen at his disposal in Paris, where it was sent by de Castro for the Exposition of 1867. (C. P. C.)

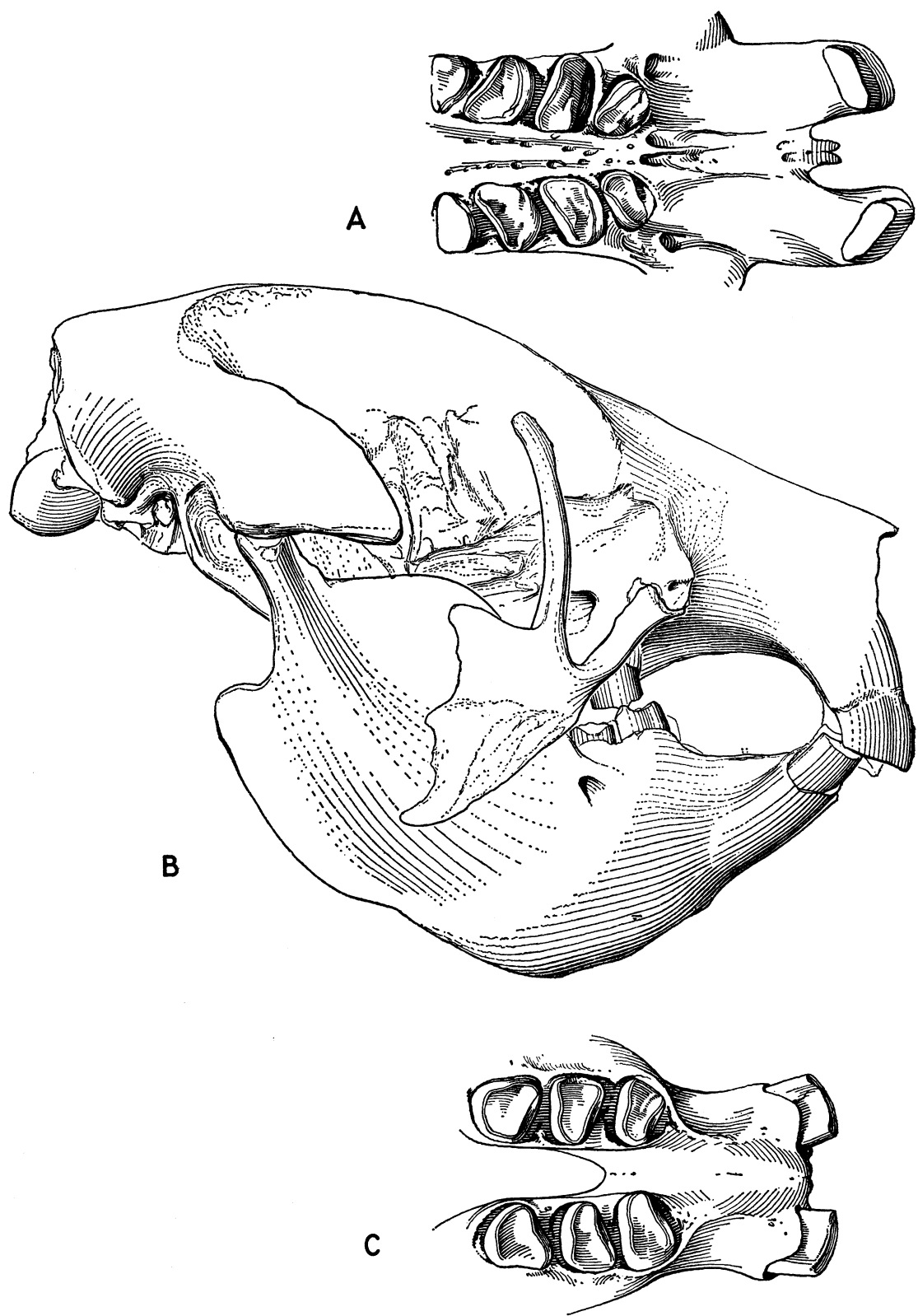


FIG. 1. *Megalocnus rodens rodens* Leidy, 1868. A.M.N.H. No. 16876, skull and mandible of mounted composite skeleton A. Palatal view of anterior part of skull. B. Right side view of skull and mandible; zygomatic region restored from A.M.N.H. Nos. 49898 and 49955. C. Crown view of dental region of mandible. Ciego Montero. All $\times \frac{1}{2}$.

49981, two right patellae; 49982, 49983, two left astragali; 49984, right astragalus; 49985, right calcaneum; 49986, navicular; 49987–49994, 49891–49895, type and hypodigms of *M. rodens casimbae*; 49995, right humerus; 49898, right zygoma, and incomplete right zygoma (complete zygoma attached to skull A.M.N.H. No. 49955); and 49899, left metatarsal III.

M.P.U.H. (no number), a mounted composite skeleton; Nos. 1676, right half of badly crushed skull; 1677, 1678, partial maxillae with teeth; 1679, partial left zygoma; 1680, almost complete mandible with teeth; 1682–1688, fragments of lower jaws with teeth; 1689, proximal end of right scapula; 1690–1692, complete left humerus and fragments of two others; 1693, 1694, incomplete right ulnae; 1695, 1696, incomplete right radii; 1697, almost complete right femur; 1698, patella; and 1699, right astragalus.

M.N.R.J. Nos. 2009-V, 2010-V, fragments of skull; 2011-V, almost complete mandible with right M_3 and left M_2 ; 2012-V–2014-V, 2082-V, fragmentary lower jaws with teeth; 2015-V, fragment of right maxilla with M^{4-5} ; 2016-V, incomplete and badly crushed skull with no teeth; 2017-V–2025-V, 2052-V–2056-V, vertebrae; 2026-V, sacrum and parts of pelvis; 2027-V, right ilium and proximal fragment of ischium and pubis of young individual; 2028-V–2030-V, proximal fragments of scapulae; 2031-V, fragmentary right humerus; 2032-V, incomplete ulna; 2033-V, incomplete radius; 2034-V, almost complete left femur; 2035-V, incomplete left tibia; 2036-V, 2037-V, two calcanea; 2038-V–2048-V, bones of tarsus and metatarsus, carpus and metacarpus, phalanges; 2049-V–2051-V, ribs; 2057-V, 2058-V, sternal pieces; 2059-V, right radius; 2060-V–2077-V, upper and lower molars; 2078-V, distal end of right humerus; 2079-V, proximal end of left radius; 2080-V, patella; 2081-V, incomplete right astragalus; 2083-V, distal part of left femur; and 2084-V, fragment of rib. M.N.R.J. Nos. 2050-V, 2051-V, and 2053-V–2056-V are doubtfully ascribed to *Megalocnus rodens*.

DIAGNOSIS

The only surely valid species of the genus. Larger than the doubtful species *M. ursulus*.

DISCUSSION

(W. D. M.)

De la Torre gives the following account of the discovery of the type specimen and its subsequent history: "The specimen is presumably in the collections of the Madrid Museum, but I can find no published record of its disposition. The genus is certainly recognizable from Leidy's description, and although there is some uncertainty as to the number of species represented, there appears to be no question that the type jaw figured by de Castro is of the species which we find abundant."

We therefore regard the mounted skeleton in the American Museum and that in the Havana Museum as composed of topotypes of *Megalocnus rodens*. In the Ciego Montero collection the bones are unassociated, and the marked variation in certain bones appropriate in size and general characters to *M. rodens* indicates either an exceptional variability or the coexistence of two or more species not distinguished by any characters in the jaws and teeth. In the absence of associated material, it appears best to refer all the skeletal material of appropriate size to *M. rodens*, although, as will be seen, they differ very considerably among themselves in some particulars.

(C. P. C.)

***Megalocnus rodens rodens* Leidy, 1868**

Plates 2–8, 13–26; text figure 1

HOLOTYPE

The same as for the species.

LOCALITY

Ciego Montero, near Cienfuegos, Cuba.

HYPODIGM

The same as for the species except for the specimens referred to *M. rodens casimbae*.

DIAGNOSIS

Incisors wider than in *M. rodens casimbae* and molars less like those of *M. ursulus*.

DISCUSSION

This subspecies is peculiar to the Ciego Montero springs, near Cienfuegos.

Measurements are given in tables 2 to 12.

(C. P. C.)

***Megalocnus rodens casimbae* Matthew**
(in schedis), new subspecies

Plate 9, figure 1, plates 10, 11, plate 12, figure 1

HOLOTYPE

A.M.N.H. No. 49987. Almost complete mandible with the two last right cheek teeth (M_{3-4}) and the left incisiform tooth (M_1). C. de la Torre collection.

LOCALITY

Casimba, Sierra de Jatibonico, Cuba.

HYPODIGN

The type and the following specimens: A.M.N.H. Nos. 49962, 49988, incomplete right lower jaws with M_{2-4} ; 49989, 49990, and 49894, 13 upper teeth; 49991, front of skull with left M^2 ; 49992, left humerus; 49993, left femur; 49994, distal end of right fibula; 49891–49893, symphyseal region of mandibles; and 49895, 13 lower teeth.

M.C.Z. Nos. 10153–10157, 10159–10161,

10163, 10165, and 17606, incomplete lower jaws (10153 is an almost complete mandible), with and without teeth (in 17606, posterior fragment of right lower jaw, the M_3 was artificially inserted; it is not a true M_3); 10297, left scapula almost completely restored; 10167, left humerus; 17614, right humerus without distal end; 8430, left tibia; 10170, proximal end of right ulna; 10171, proximal half of right ulna; 10173, 10177, incomplete left radius; 10178, partial right radius, restored; 10181, left humerus; 10185, 10187, and 10189, incomplete ulnae; 10188, left radius; 10193–10195, 10197, complete and incomplete femora; 10203, left femur, probably young adult; 10209–10212, complete and incomplete tibiae; 17613, distal parts of right and left tibiae.

A.M.N.H. Nos. 49988, 49990–49994 are of doubtful provenience; it is not certain whether they come from Casimba or Ciego Montero.

Some of the skeletal remains, other than lower jaws, in the collection of the Museum of Comparative Zoölogy are assigned to *Megalocnus* with some doubt. M.C.Z. No. 10181, a

TABLE 13

MEASUREMENTS (IN MILLIMETERS) OF THE MANDIBLE OF *Megalocnus rodens casimbae*

	Length from Pos- terior End of Angu- lar Proc- ess to Anterior End of Symph- ysis	Length from Posterior End of Condyle to Ante- rior End of Symph- ysis	Depth from Top of Cor- onoid Proc- ess to Lower Bor- der of Man- dible Im- mediately Anterior to Dental Foramen	Depth Under M_1	Depth at Posterior End of Symph- sis	Distance Between Centers of Condyles	Width Under M_1	Width Between Symphysis and Exter- nal Border of Alveo- lus of M_1	Width of Con- dyle
A.M.N.H. No. 49987*	—	185	—	51.5	52	85	22.5	23	35.2
A.M.N.H. No. 49988	—	180	—	55.1	45.6	—	—	—	—
M.C.Z. No. 10153	220a	260a	155a	53	44	112.5a	33	27	34
M.C.Z. No. 10154	—	—	—	56.5	56	—	30.2	26	—
M.C.Z. No. 10157 ^b	—	—	—	—	45	—	29.6	25	—
M.C.Z. No. 10159	—	—	—	—	49	—	—	27.2	—
M.C.Z. No. 10160	—	—	—	—	51.5	—	—	28	—
M.C.Z. No. 10155	—	—	—	—	50	—	—	26.5	—
M.C.Z. No. 10156	—	—	—	—	40	—	—	21.2	—
M.C.Z. No. 10161	—	—	—	—	43.5	—	—	20	—
M.C.Z. No. 10163	—	—	—	56.7	49.5	—	25.2	21.4a	—
M.C.Z. No. 10164 ^b	—	—	—	37a	33	—	23	11.8	—

* Type.

^b Young.

TABLE 14
MEASUREMENTS (IN MILLIMETERS) OF THE LOWER TEETH OF *Megalocnus rodens casimbae*
AND *Megalocnus ursulus*

	M ₁₋₄ L	M ₁ L W	M ₂ L W	M ₃ L W	M ₄ L W
<i>M. r. casimbae</i>					
A.M.N.H. No. 49987 ^a	108	9.5 16.8	— —	15.2 18.3	18.7 17.1
A.M.N.H. No. 49988	—	— —	12.8 18.4	13.4 18	17.7 16.5
M.C.Z. No. 10153	108	8 20	13 19	15 19.5	20.5 20
M.C.Z. No. 10154	103	8 19.7	14 21.1	15.2 21.4	20.5 20.8
M.C.Z. No. 10157 ^b	102a	7.5a 18.5a	13.5 19	16 22	20.5a 19a
M.C.Z. No. 10159	—	8a 20a	— —	— —	— —
M.C.Z. No. 10160	—	7.5 20	— —	— —	— —
M.C.Z. No. 10155	107a	8.5a 21.5a	14a 20.2a	15a 20a	20a 18a
M.C.Z. No. 10156	—	6.5 17.2	— —	— —	— —
M.C.Z. No. 10163	105a	12a 19a	13.3 16.5	14.8 16.5	19a 17a
M.C.Z. No. 10164 ^b	76a	6a —	11.2a 14.3a	11.8 13.9	15 13
<i>M. ursulus</i>					
A.M.N.H. No. 49997	—	— —	7.0 8.4	6.8 8.1	8.4 7.2

^a Type.

^b Young.

left humerus, for instance, is slightly shorter, but relatively much narrower, than the humeri definitely ascribed to *Megalocnus*. M.C.Z. No. 10189, the proximal end of a right ulna, is sensibly smaller, in general, than the specimens definitely assigned to *Megalocnus*. They and some of the other specimens may be *Mesocnus*.

DIAGNOSIS

(W. D. M.)

Incisors about two-thirds as wide as in *M. rodens* [*rodens*]; molars intermediate between those of this species and those of the following species.

(C. P. C.)

The mean for five specimens measured for WM₁/WM₂ is 1.03. The lower border of the mandible is relatively less convex.

TABLE 15

MEASUREMENTS (IN MILLIMETERS) OF THE SCAPULA OF *Megalocnus rodens casimbae*
(M.C.Z. No. 10297)

Width of neck of scapula	48
Length of glenoid cavity	37
Width of glenoid cavity	23

DISCUSSION

(W. D. M.)

About a third of the specimens from the Casimba locality [in the American Museum of Natural History collection] are referable to this form. Although there is a certain amount of intergrading with the typical *M. rodens* [*rodens*], the two are fairly distinct.

(C. P. C.)

All the specimens from Ciego Montero are surely referable to *M. rodens rodens*. Some of the specimens collected in Casimba, Sierra de Jatibonico, for instance, A.M.N.H. No. 49991, the anterior part of a skull, and several of the teeth under the numbers 49894 and 49895, are also of suitable size and morphology to be referred to the typical form. If this supposition is confirmed by future discoveries of indubitable remains of *M. rodens rodens* in the Casimba region, the subspecies here described is not certainly valid. The differences between the specimens referred to *M. rodens casimbae* and those ascribed to *M. rodens rodens* may in that case be interpreted as individual variations of *M. rodens*, without subspecific distinction.

Only further and careful collecting at Ciego Montero and, particularly, at the Casimba

TABLE 16
MEASUREMENTS (IN MILLIMETERS) OF THE HUMERUS OF *Megalocnus rodens casimbae*

	M.C.Z. (no number)	M.C.Z. No. 17614	M.C.Z. No. 10181	M.C.Z. No. 10167
Total length	221	—	205	222
Anteroposterior diameter of head	33.5	33.5	30	36
Anteroposterior diameter of proximal end	40	40	39	46
Width of head	34	30.8	28.8	34
Width of proximal end	56	57a	52.8	63
Width of shaft	42a	34	26	42.4
Width of distal end	90a	—	75	90
Width of trochlea	51	—	40.8	51.3
Depth of trochlea	24	—	21.3	25.8
Length of greater trochanter	—	—	—	28
Width of bicipital groove	13a	16	13a	15a

TABLE 17
MEASUREMENTS (IN MILLIMETERS) OF THE RADIUS OF *Megalocnus rodens casimbae*

	M.C.Z. No. 10188	M.C.Z. No. 10178	M.C.Z. No. 10177	M.C.Z. No. 10173
Total length	185	188a	—	—
Width of head	22.4	23.5	25.5	—
Width of neck	14.8	18	18.2	—
Width of shaft	31	29.5a	32.5	—
Width of distal end	38	—	—	37.8

TABLE 18
MEASUREMENTS (IN MILLIMETERS) OF THE ULNA OF *Megalocnus rodens casimbae*

	M.C.Z. No. 10187	M.C.Z. No. 10171	M.C.Z. No. 10170	M.C.Z. No. 10185
Length	—	—	—	—
Length of sigmoid notch	34.2	35.8	38	32
Greater length of olecranon	32	30.2	39	30
Lesser length of olecranon	30.6	29.8	34	29.2
Width of olecranon	30	28.2	34	23.4
Length of shaft	24.5	—	—	—
Lesser diameter of great sigmoid notch	22.2	29	27	22.2
Width of sigmoid notch	39	41	45	35

TABLE 19
MEASUREMENTS (IN MILLIMETERS) OF THE FEMUR OF *Megalocnus rodens casimbae*

	M.C.Z. No. 10193	M.C.Z. No. 10195	M.C.Z. No. 10194	M.C.Z. No. 10197	M.C.Z. No. 8430	M.C.Z. No. 10203
Length	257	248	—	235	249	187
Length of neck	36a	23	—	30	31	33
Width of proximal end	104	95	—	94.3	94	75.2
Width of head	42	41.5	—	42.2	43.6	35.7
Width of distal end	94	88	91	89.4	90	75
Width of shaft	52.5	47.6	56a	48.5	58	41
Width of condyles	81	76.3	77.5	73.8	70	62
Width of fossa intercondyloidea	15	15	15.2	12	10	10.5

TABLE 20
MEASUREMENTS (IN MILLIMETERS) OF THE TIBIA OF *Megalocnus rodens casimbae*

	Length	Length of Proximal Epiphysis	Width of Popliteal Notch	Width of Shaft	Width of Proximal Epiphysis	Width of Distal Epiphysis	Length of Distal Epiphysis	Width of Distal Articular Surface
M.C.Z. No. 10209	187	55.5a	27	31	78	59	40	46.6
M.C.Z. No. 10210	180	62	20	30	78a	—	—	—
M.C.Z. No. 10212	156	51.8	19	29	65.2	52.2	37.2	41
M.C.Z. No. 10211	155	50.5	19	29	66.8	52	35.5	41
M.C.Z. No. 10213	157	48	12.5	25	62	46.8	37.2	40
M.C.Z. No. 17613	—	—	—	30.8	—	58a	41	44
M.C.Z. No. 17613a	—	—	—	31.8	—	—	44.8	48.5
M.C.Z. No. 8430	—	—	—	27	—	53.2	37.8	42

localities can remove this doubt. The exact origin of several specimens in the American Museum of Natural History collection, principally some of those labeled as from Casimba, seems to be uncertain. The collection was uncatalogued for about 38 years, because most of it was to be returned to the Havana Museum. Nevertheless, the type and some of the referred specimens suggest that Matthew's proposed subspecies are fairly distinct.

Measurements are given in tables 13 to 20.

(C. P. C.)

Megalocnus ursulus Matthew (in schedis),
new species

Plate 9, figure 2, plate 12, figures 2, 3

Megalocnus ursulus MATTHEW (in schedis).

Megalocnus junius MATTHEW (in schedis).

HOLOTYPE

A.M.N.H. No. 49996. Incomplete lower jaw, without teeth. C. de la Torre collection.

HYPODIGM

The type and A.M.N.H. Nos. 49997, almost complete left lower jaw from a very young individual, with the three cheek teeth (M_2-4 ; type of *Megalocnus junius* Matthew, in schedis), Moreno collection; 49896, anterior fragment of left lower jaw of a young individual; and 49897, 16 teeth, Moreno collection.

LOCALITY

(W. D. M.)

Casimba, Sierra de Jatibonico.

DIAGNOSIS

Size about two-thirds of *M. rodens*. . . . Convexity of jaw beneath and behind last molar much less. [Molar teeth less broad. M_3] possibly one-sixth wider than long.

(C. P. C.)

DISCUSSION

The type mandible of *Megalocnus ursulus* is about two-thirds as large as that of *M. rodens rodens*. The convexity of the lower border under the cheek teeth is relatively much weaker than in the type form and is about as strong as in *M. rodens casimbae*. The mandible, in general, closely resembles that of *M. rodens casimbae*. The morphology and proportions, including those of the teeth, are about the same. It is thus possible that *M. ursulus* will prove to be the young of *M. rodens casimbae* from the same locality. Decision on this point depends on future field explorations in Cuba. Elsewhere than in his manuscript, Matthew made the following remarks on this subject: "I am much more doubtful as to how many species are represented. Provisionally I have separated three species of *Megalocnus*, *rodens*, *ursulus* and *junius*, with an intermediate form, *M. rodens casimbae*. But these may be partly due to age and individual differences, although they can hardly be all referred to one species, for the range in size is over 300 per cent, far more than in a series of differently aged skulls of *Bradypus* and *Choloepus*. There are surely two and probably three species of *Megalocnus*; probably two of *Mesocnus*, one each of

the other genera." (Letter from Matthew to C. de la Torre, November 12, 1914.)

Measurements of the teeth are included in table 14.

(C. P. C.)

MESOCNUS MATTHEW, 1919

Mesocnus DE LA TORRE AND MATTHEW, 1915, p. 152 (*nomen nudum*). MATTHEW, 1918, p. 660 (*nomen nudum*); 1919a, p. 168; 1931, p. 2.

?*Parocnus* MILLER, 1929, p. 28 (in part).

GENOTYPE

Mesocnus browni Matthew, 1931.

DISTRIBUTION

Pleistocene. Cuba, ?Haiti.

DIAGNOSIS

(W. D. M.)

[Dental formula: $\frac{5}{4}$.] Anterior teeth [M_1^1] of moderate size, the upper pair oval [in cross section, arched] and obliquely set, as in *Megalonyx*, the lower pair almost semicircular [or roughly rounded-triangular] in cross section, the inner side deeply grooved. Symphysis with a rather long median tongue slightly decurved. Cheek teeth subquadrate, obliquely set, the last lower teeth largest. Skull slender, more elongate anteriorly, with a marked constriction in front of cheek teeth. Humerus without entepicondylar foramen. [Femur with strong greater and lesser trochanters and weak third trochanter.]

(C. P. C.)

***Mesocnus browni* Matthew, 1931**

Plate 27, figure 1, plate 28, plate 29, figures 1, 2, plate 30, figure 1, plate 31, figure 1, plates 32-35; text figure 2

Mesocnus browni MATTHEW, 1931, p. 2.

HOLOTYPE

A.M.N.H. No. 16877. Anterior half of skull.

LOCALITY

Ciego Montero. The American Museum of Natural History expedition of 1911.

PARATYPE

A.M.N.H. No. 16878, partial lower jaw with alveoli of right and left M_1 ("canini-

form" tooth) and left M_{2-4} preserved. Same locality.

HYPODIGM

The types and the following specimens: A.M.N.H. Nos. 49900, partial right maxilla with M^2 ; 49901-49908, right and left upper molars; 49909-49916, right and left lower molars, all from Ciego Montero; 49917, anterior part of a mandible with alveoli of right and left M_1 ("caniniform" tooth), and the anterior portion of the alveoli of right and left M_2 , from Casimba, Sierra de Jatibonico; 49918, right humerus from Ciego Montero; 49919, left femur; 49920, left patella, both from Casimba; 49921, right tibia, somewhat incomplete; 49922, fragmentary right astragalus; 49926, distal end of right humerus, all

TABLE 21

MEASUREMENTS (IN MILLIMETERS) OF THE SKULL AND UPPER TEETH OF THE TYPE OF *Mesocnus browni* (A.M.N.H. No. 16877)

Skull	
Width between postorbital processes	56a
Width between lacrimal foramina	49
Width between internal borders of infra-orbital foramina	37
Width between external borders of alveoli of upper caniniform teeth (M^1)	42a
Width between external borders of nasal openings	31a
Height from top of frontals, just behind postorbital process, to palate	69
Height from top of nasals, just above end of alveoli of M^1 , to palate	31
Width of palate between M^1	24
Width of palate between M^3	15
Teeth	
Length of diastema between M^1 and M^2	34
Length of M^{2-4} series	35a
M^1	
L	10a
W	9.5a
M^2	
L	9.5a
W	9.5a
M^3	
L	9.2a
W	12a
M^4	
L	9.3a
W	12a

from Ciego Montero; 49924, distal end of left tibia; and 49925, left fibula.

M.P.U.H. Nos. 1650, 1651, fragments of right lower jaws with and without teeth; 1652, right humerus; 1653–1659, right and left upper teeth; 1660–1665, right and left lower teeth, all from Ciego Montero; 1666, right patella from Casimba; 1667, fragment of left astragalus from Ciego Montero; and 1668, 1669, distal end of right and left femora, respectively, from Casimba.

M.N.R.J. Nos. 1993-V, fragment of left lower jaw with M_2 -s; 1994-V, anterior part of lower jaw with alveolus of left M_1 and anterior part of the alveolus of left M_2 ; 1995-V–1999-V, right and left upper molars; 2000-V–2004-V, right and left lower molars; 2005-V, distal part of right humerus; and 2006-V, proximal portion of right humerus, all from Ciego Montero.

M.C.Z. Nos. 10350, symphyseal region of a mandible, and a lower jaw; 10351, fragment of symphyseal region of a mandible; 10304, left and right astragali, all from Moreno collection, Casimba, Sierra de Jatibonico.

DIAGNOSIS

A relatively robust species, about four-sevenths as large as *Megalocnus rodens rodens*. Last lower molar (M_4) with posterior and internal faces about as long as the opposite ones, and forming a rounded right angle.

DISCUSSION

(W. D. M.)

The skull is widely different from that of *Megalocnus*, and intermediate in some features between the skull of that genus and that of the Santa Cruz [Santacruzian] Megalonychidae, [and peculiar in other features. It is] narrow and rather deep in the orbital region . . . [It becomes abruptly constricted in front of the orbits but widens a little at the snout, where it is less than half as deep as in the orbital region. The snout is rather elongate and tubiform, much more elongate than in *Megalocnus* and *Acratocnus*. The postorbital process is weak. The infraorbital foramen is large but short and opposite M^1 , and placed slightly above the alveolar border.] Although the cranial portion is not preserved, the relations of the jaw condyles to the tooth row in-

dicate that the basicranial and basifacial axes were nearly in the same plane, the front of the skull not depressed relative to the cranium as it is in *Megalocnus* and *Miocnus* [*Acratocnus*].¹

The palate is narrow, its width between the tooth rows barely exceeding the width of either row. Immediately in front [of M^2] it is sharply constricted and expands again anteriorly to the oval canine [M^1 or "caniniform" tooth] alveoli, which are about [one and one-half times] as far apart as the molars. In front of these it extends forward, the maxillaries ending about $\frac{1}{4}$ inch in front of the canines ["caniniform" teeth], and deeply notched at the middle line [region], the premaxillaries extending farther forward as flat plates [bones], only a small part of which [were] preserved [when the skull was studied for the first time]. These premaxillae, so far as preserved, resemble those of *Eucholoeops* and *Megalonychotherium*. [The alveolus of the "caniniform" tooth (M^1) is oval, and separated from the posterior molars by a diastema almost as long as the total length of M^2 -4] and very like that of *Megalonyx*; the tooth, however, as will be seen, is widely different. The [alveoli of the posterior molars (M^2 -5)] are of characteristic form, the first [the alveolus of the second being] triangular, with broad side internal, those of the second and third obliquely quadrate, wider than long; the [third and] fourth triangular like the first [second] but with flat side outward [posterior].

LOWER JAW: [The lower jaw is relatively strong and somewhat massive.] There is some suggestion of *Megatherium* in the elongate, decurved, spout-like, symphyseal tongue and [the relatively strong convex expansion] of the inferior border beneath and behind the molars. Otherwise it is more like that of the Santa Cruz [Santacruzian] Megalonychidae, although not [particularly] near to any one of them. The canine alveoli [of the "caniniform" teeth (M_1)] are about 20 mm. apart

¹ A picture of a skull of *Mesocnus* recently found in Cuba by the Sociedad Espeleológica de Cuba, and sent to me by Dr. Oscar Arredondo, together with a collection of pictures of specimens of Cuban edentates, shows that the basifacial and basicranial axes of the skull of *Mesocnus* were not in the same plane, the front of the skull being depressed relative to the cranium. (C. P. C.)

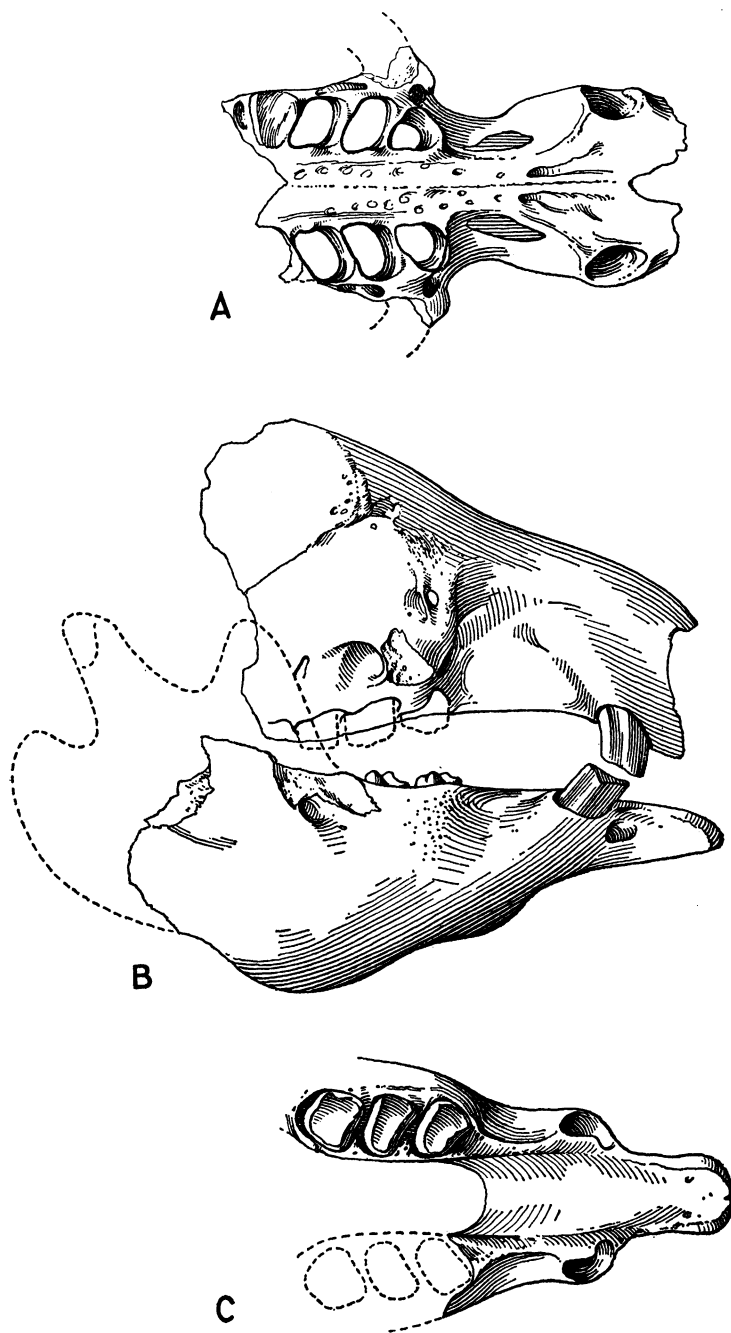


FIG. 2. *Mesocnus browni* Matthew, 1931. A. Partial skull, type, A.M.N.H. No. 16877, palatal view. B. Same skull, lateral view, with paratype mandible, A.M.N.H. No. 16878, lateral view ("caniniform" teeth restored). C. Paratype mandible, top view. Ciego Montero. All \times ca. 3/5.

and [separated from the posterior teeth by a diastema as long as the total length of M_{2-3}]. The symphyseal tongue is spatulate, decurved, 28 mm. long and 17 wide, with a sharp median crest on the under side. The anterior mental foramina are remarkably large, and the anterior end of the symphysis is rugose and somewhat thickened. These apparently indicate an extended flexible lower lip such as is generally attributed to *Megatherium*.

TEETH: The upper canine ["caniniform" tooth (M^1)] is very strongly arched in a fore-and-aft direction, the lateral curvature being slight. It is rudely oval in cross section, with a flat [or slightly concave] internal face, a concave postero-internal, and a long convex antero-external, face. All the faces are longitudinally ribbed. This tooth is quite distinct from that of *Megalonyx*, although the alveolus in which it fits might appear to indicate a very similar tooth. [It is also very different from that of *Megalocnus*.]

Of the upper cheek teeth, the first [the second upper molar (M^2)] is a nearly trigonal prism [roughly triangular-truncated in cross section], the [slightly concave] internal face and the [flat] antero-internal face [meeting at an angle of about 133 degrees]; the other faces are a flat [or slightly convex] antero-external and a wider, slightly concave postero-internal. The second and third molars [the third and fourth upper molars (M^{3-4})] have a flat [or slightly concave] internal, a [wide and] moderately convex antero-internal, and a narrow and convex external face, hardly distinguishable, and a wider, slightly concave postero-external face. The last [upper] molar [M^5] is [roughly] trigonal, [with convex external and anterior faces, wider and flat posterior face and very short convex internal face, forming the rounded angle between the anterior and the posterior face].

[The lower "caniniform" tooth (M_1)] is of rather peculiar form, rudely meniscoid in cross section, and with a concave, [deeply grooved], postero-internal, a flat [or slightly convex] anterior face, [a slightly convex and short internal face], and a medially flat external face, curving anteriorly and posteriorly to the other faces. The tooth is but slightly curved, and somewhat smaller than in *Miocnus* [*Acratocnus*] *antillensis*.

The three [posterior lower teeth (M_{2-4})] increase from first to third [progressively] in size from [the anterior to the posterior], all of them being more or less trapezoidal in cross section, but set obliquely in the jaw. The first and second [second and third (M_{2-3})] are [much] wider than long, and the external side is wider than the internal; [the antero-internal face is wide and slightly concave in cross section, the antero-external flat or slightly convex, the internal short and rounded, and the postero-external wider and slightly convex. The last lower molar (M_4)] is more nearly quadrate; [the wider antero-internal face is slightly concave medially, the antero-external is anteriorly rounded and posteriorly flat, and the internal is curved to the postero-external, which is flat¹]. All of them curve backward in the jaw, so that the base of M_2 [M_3] lies beneath M_3 [M_4].

The near relationship of these teeth to those of *Megalocnus* is noticeable in every detail. They are not so specialized or so diverse from the primitive Santa Cruz [Santa-cruzean] type. The canines ["caniniform" teeth] are only partly intermediate, these and the muzzle generally indicating a somewhat peculiar specialization.

HUMERUS: A type of humerus of the size appropriate to *Mesocnus browni* is found in the Ciego Montero collections in numbers proportionate to the teeth as compared with those of *Megalocnus*. They are distinguished from the humeri of the larger genus by the smaller size and slender shaft, and especially by the absence of any entepicondylar bridge and the narrower ulnoradial joint, with the radial ball at the front of the articulation less prominent and cut off on the [internal] side by the limitation of the faceted surface [which is relatively and absolutely more expanded anteroposteriorly than in *Megalocnus*].

(C. P. C.)

The humerus of *Mesocnus* resembles that of

¹ In the specimen M.P.U.H. No. 1650, a fragment of right lower jaw with M_{2-4} preserved, the last lower molar (M_4) is roughly triangular instead of quadrate in cross section, its antero-internal face being the widest. It resembles the same tooth in *Mesocnus torrei*, but its size, as well as the size of the anterior molars and the size and strength of the whole specimen, suggests the larger species, i.e., *Mesocnus browni*. (C. P. C.)

TABLE 22

MEASUREMENTS (IN MILLIMETERS) OF THE MANDIBLES AND LOWER TEETH OF THE TYPE AND REFERRED SPECIMENS OF *Mesocnus browni* AND *Mesocnus torrei*

	<i>M. browni</i> , A.M.N.H. No. 16878, Paratype	<i>M. browni</i> , M.P.U.H. No. 1650	<i>M. torrei</i> , A.M.N.H. No. 16879, Type	<i>M. torrei</i> , M.P.U.H. No. 1670
Depth of mandible at posterior end of symphysis	30.5	—	26	24.5
Depth of mandible at external side of M ₄	48a	—	32.5	40a
Width of horizontal ramus at posterior end of symphysis	21	—	16	14
Width between symphysis and external border of the "caniniform" tooth (M ₁)	18	—	14.5	13
Length of symphyseal tongue anterior to "caniniform" teeth	25.5	—	22	—
Length of diastema between "caniniform" tooth (M ₁) and M ₂	20	—	20	15
Length of M ₂₋₄ series	34.3	—	24.5	26a
M ₁				
L	10a	—	6.5	7.5
W	5a	—	4	4
M ₂				
L	8.3	7	5.5	6
W	11.5	11	8.5	9.2
M ₃				
L	8.3	7	7.5a	7.5a
W	12	12	10a	11.5a
M ₄				
L	9.5	8.5	8	8.5a
W	12	12	9.3	10.5a

TABLE 23

MEASUREMENTS (IN MILLIMETERS) OF THE HUMERUS OF *Mesocnus browni* AND *Mesocnus torrei*

	<i>M. browni</i> , A.M.N.H. No. 49918	<i>M. browni</i> , M.P.U.H. No. 1652	<i>M. browni</i> , M.N.R.J. No. 2006-V	<i>M. torrei</i> , A.M.N.H. No. 49927
Length	218	195	—	150
Length of head	36.5	33	36	23
Width of head	40	37	43	25
Width of proximal end	63.5	53.5	60.5	40
Length of greater trochanter	34.5	33	34.5	21
Width of bicipital fossa (notch)	19	15	10	8
Length of diaphysis	30.5	30	31.5	19.5
Width of diaphysis	38	34	25.5	20a
Width of distal end	73.5	66	—	51
Width of trochlea	51	44	—	33
Depth of trochlea	24.5	20	—	16.5
Width of olecranon pit	25	18	—	16

Nothrotherium in its slender construction, but it is relatively more bulky and is in this respect intermediate between the humerus of *Nothrotherium* and that of *Megalonyx*. It differs, at first sight, from that of *Nothrotherium* and *Megalonyx* in the absence of the entepicondylar foramen and in the strength of the deltoid process, which is even more prominent than in *Megalonyx* and somewhat similar to that of *Paramylodon*, although not so strong as in the Mylodontidae. In accordance with the greater strength of the deltoid crest, the musculo-spiral course is also stronger than in *Nothrotherium*. The proximal end of the humerus is relatively wider than in *Nothrotherium* and about as wide as in *Megalonyx*. The head of the humerus is large and rounded but generally less prominent than the greater tuberosity. In this it differs from *Nothrotherium* and *Megalonyx*, but resembles *Megalocnus* and the Mylodontidae, e.g., *Paramylodon* and *Lestodon*. The greater tuberosity is very strong, extending almost throughout the whole extension of the external side of the head. The lesser tuberosity is well developed but relatively weaker than in *Nothrotherium* and *Megalonyx*. The distal or lower end of the humerus is relatively narrower than in *Megalonyx* or even than in *Nothrotherium*. It is otherwise similar to that of the latter genus and consequently weaker than in *Megalonyx* and *Megalocnus*. The crista pronatoria is also weak; it is relatively less developed than in *Nothrotherium* and *Megalocnus*, and much weaker than in *Megalonyx*. The olecranon fossa is strong, deeper than in *Megalocnus* and *Megalonyx*, and perhaps as deep as in *Nothrotherium*. The articular facets for radius and ulna are relatively much broader anteroposteriorly than in *Nothrotherium* and almost as broad as in *Megalonyx*. The radial facet is similar to that of *Megalonyx* and *Megalocnus*, but the ulnar facet is relatively and absolutely broader and more flattened anteroposteriorly than in *Megalocnus*, and it seems to be relatively a little broader than in *Megalonyx*.

(W. D. M.)

The same type [of humerus] is found in the Casimba collections, but with it occurs another type not seen at Ciego Montero, of about the same size and evidently quite distinct, probably that of *Miocnus* [*Acratocnus*].

The correctness of this allocation is confirmed by (first) the relative scarcity of the supposed *Miocnus* [*Acratocnus*] type of humerus in the Casimba collections, and its entire absence from the Ciego Montero collections. Jaws and teeth of *Mesocnus* and *Miocnus* [*Acratocnus*] occur in the Casimba material, but *Miocnus* [*Acratocnus*] is less common, while in the larger collections from Ciego Montero no *Miocnus* [*Acratocnus*] jaws or teeth are found. (Second), the supposed *Miocnus* humerus is very much like that of *Acratocnus*, a genus that is certainly closely related in teeth and jaws.

(C. P. C.)

FEMUR: Two types of femora of different sizes occur in the Casimba collections. The smaller one is almost indistinguishable in shape and strength from that of *Acratocnus*; the larger presents similar features, but is stronger and clearly distinct from that of *Acratocnus*. The first type may be almost certainly referred to *Acratocnus* (= *Miocnus*), and the second probably belongs to *Mesocnus browni*. Both types are much smaller and easily distinguishable from that of *Megalocnus*. The femur ascribed to *Mesocnus* is represented by a single specimen, consisting only of the proximal half. It is slender and elongate, as are those of *Acratocnus* and of the Santacruzian forms and, consequently, is very different from the femora of *Nothrotherium*, *Megalonyx*, and *Megalocnus*. The head of the femur is well developed, semi-spherical, with no pit for the ligamentum teres, and is prominent. The greater trochanter is strong, curved inward, and projecting at the proximal end almost as much as the head, from which it is separated by a deep depression (digital fossa). The lesser trochan-

TABLE 24
MEASUREMENTS (IN MILLIMETERS) OF THE FEMUR
OF *Mesocnus browni* (A.M.N.H. No. 49919)

Distance between greater and lesser trochanters	55.5
Width of proximal end	52
Length of head	29
Width of head	28
Length of greater trochanter	25.5
Width of diaphysis (shaft)	30a

TABLE 25
MEASUREMENTS (IN MILLIMETERS) OF THE
PATELLA OF *Mesocnus browni*

	A.M.N.H. No. 49920	M.P.U.H. No. 1666
Length	18.5	18
Width	38	33.5
Depth	42	30a
Length of articular surface	21	22a
Width of articular surface	35	33.5

ter, placed just below and behind the head of the femur, on the inner side, is strong and conical, like the trochanters of *Acratocnus* and of the Santacruzean genera, e.g., *Hapalops*. The third trochanter is, however, relatively weak, not so prominent as in *Acratocnus*, and much less conspicuous than in the Santacruzean forms. The distal end of the femur, which is not preserved, was certainly more or less similar to that of *Acratocnus* and *Hapalops*, by inference from the preserved portion.

PATELLA: A left patella from Casimba is doubtfully ascribed to *Mesocnus browni*. It is an almost perfect isosceles triangle in outline, with the vertex pointed down, and resembles in its general features especially the patella of the Miocene (Santacruzean) forms, e.g., *Hapalops*, and, to a lesser extent, the patellae of *Megalonyx* and *Megalocnus*. It differs clearly from that of *Nothrotherium*. The articular surface for the femur is divided into two lateral convergent facets by an intermediate, longitudinal, smooth ridge; both the lateral facets are slightly concave, roughly ovate in outline, with the vertical diameter greater. The anterior face is marked by a series of irregular longitudinal ridges.

TIBIA: One right tibia and distal ends of one right and one left tibia from Ciego Montero are of appropriate size to be referred to *Mesocnus browni*. The right tibia is almost complete, lacking only the anterior part of the proximal end and a small fragment of the internal side of the distal epiphysis. It is also relatively slender and resembles much more the tibia of *Acratocnus* and of the Santacruzean relatives than that of the continental Pleistocene genera, such as *Nothrotherium* and *Megalonyx*, but it is not so curved posteriorly as in the Santacruzean forms and in

Acratocnus. The inner articular facet for the femur is large, concave, and roughly elliptical in outline, with its greater diameter obliquely oriented from the anterior end of the dorsal spine posteriorly inward. The outer articular facet for the femur is very incomplete in this specimen. As far as can be judged from its posterior part, it seems that it was similar to that of *Acratocnus*. The dorsal spine is almost as prominent as in *Acratocnus* and in *Hapalops*, but is relatively much less conspicuous than in *Megalocnus* and *Nothrotherium*, and more prominent than in *Megalonyx*. The articular facet for the fibula, on the external side of the proximal epiphysis, is almost completely lacking by fracture. It seems to have been similar to the same part of the tibia of *Acratocnus*. The diaphysis is approximately oval in cross section, instead of being longitudinally grooved on its external side, as is the case in *Acratocnus*. The inner malleolus is very small and bears a prominent internal process and two oblique posterior tendinal grooves as in *Hapalops*. The internal process of the malleolus is also grooved by a tendinal channel, like that of the Miocene (Santacruzean) relatives. The articular end for the astragalus is divided into two facets, separated from each other by a sharp anteromesial crest (intercondylar crest). The external facet is almost twice as long as the internal, and is longitudinally and transversely concave. Its internal border reaches anteriorly to the top of the intermediate crest and

TABLE 26
MEASUREMENTS (IN MILLIMETERS) OF THE TIBIA
OF *Mesocnus browni*

	A.M.N.H. No. 49921	A.M.N.H. No. 49924
Length	168	—
Width of proximal end	60a	—
Length of inner glenoid cavity	32a	—
Width of inner glenoid cavity	36.5	—
Length of diaphysis	16	16.5a
Width of diaphysis	25	26a
Length of distal end	37	38
Width of distal end	50	48.5
Width of distal articular surface (trochlea)	36a	38

TABLE 27

MEASUREMENTS (IN MILLIMETERS) OF THE ASTRAGALI OF *Mesocnus browni* AND *Mesocnus torrei*

	<i>M. browni</i> , M.P.U.H. No. 1667	<i>M. browni</i> , A.M.N.H. No. 49922	<i>M. browni</i> , M.C.Z. No. 10304	<i>M. torrei</i> , A.M.N.H. No. 49923
Length	—	—	47.3 (41.1) ^a	36
Width	—	—	—	29
Length of outer articular tibial facet	41a	54a	—	28.2
Length of inner articular tibial facet	—	—	—	13.5
Width of outer articular tibial facet	26a	23a	—	13
Width of inner articular tibial facet	19a	—	—	11
Length of fibular facet	—	—	—	10.5
Depth of fibular facet	—	—	17.2 (13.2)	12
Length of outer articular calcaneal facet (ectal)	37a	38a	34 (27)	23.3
Width of outer articular calcaneal facet (ectal)	18a	22a	18.2 (16a)	11
Length of inner articular calcaneal facet	—	—	13 (11.5)	14a
Width of inner articular calcaneal facet	—	—	12 (12)	14a
Length of sulcus talis	27a	—	—	18
Width of sulcus talis	11a	—	—	6.5

* The numbers in parentheses refer to a second specimen.

converges posteriorly with the internal articular facet. The internal facet is transversely concave but longitudinally convex, its anterior part arising to the anterior face of the distal epiphysis, and its internal border arising to the top of the intercondylar ridge. The distal articular surface for the fibula is very small, shallow, approximately oval in outline, its anterior part wider than the posterior. It is slightly concave transversely and almost flat longitudinally. It is almost convergent with the anterior end of the external border of the external articular facet for the astragalus, with which it forms a rounded angle of about 130 degrees.

FIBULA: The fibula assigned to *Mesocnus browni* is elongate and slender, with moderately expanded epiphysis, and resembles the fibulae of *Nothrotherium* and *Hapalops*. The greater diameter of the proximal and distal ends is the anteroposterior. The proximal articular facet for the tibia is roughly ovate in outline, slightly concave anteroposteriorly, its anteroposterior diameter being the longer. The inner side of the shaft is flattened; the external side is convex. The distal epiphysis is pyramidal in shape, as in *Nothrotherium*, but its anteroposterior diameter is longer than the transverse diameter. The tibial facet is flattened and directed upward and

inward. The astragalar facet is almost vertical and turned inward; it is slightly convex anteroposteriorly and meets the tibial facet at a right angle.

ASTRAGALUS: The astragalus is known only from two fragmentary specimens, both lacking the internal and the anterior parts. It is very different from the astragali of *Megalocnus*, *Megalonyx*, *Acratocnus*, and *Hapalops*, and somewhat similar to that of *Nothrotherium*. Its most obvious difference from the almost flat astragali of the four genera first cited is the oblique development of the articular surface for the tibia, which is divided into two parts directly connected to each other, the angle between them being about 90 degrees. The inner part of the articular surface is formed by a high odontoid process, which is directed inward and upward, the outer part being low, semicircular or crescentic around the odontoid process, and almost flat or gently convex on its dorsal or articular surface. This suggests the conditions found in the astragali of *Nothrotherium* and of the Mylodontidae and Megatheriidae. *Mesocnus* would, therefore, walk on the outer side of the pes. The outer articular surface for the tibia is much less convex anteroposteriorly than in *Megalocnus*, *Megalonyx*, *Acratocnus*, and *Hapalops*, and is similar to that of *Nothro-*

therium. It is also externally and transversely convex and occupies the whole length of the astragalus, being separated from the neck by a deep anteroposterior notch, which articulated with the intercondylar crest of the articular surface of the tibia. The calcaneal face of the astragalus is partially known. The external facet (ectal) is elongate and moderately convex anteroposteriorly. It seems to have been separated from the internal facet (sustentacular) by a deep longitudinal notch (sulcus talis). Owing to the fragmentary condition of these specimens the relations between the ectal and the cuboidal facets and the other characters of the astragalus cannot be determined.

Measurements of the type specimens and of some of the referred specimens are given in tables 21 to 27.

(C. P. C.)

Mesocnus torrei Matthew, 1931

Plate 29, figure 3, plate 30, figure 2, plate 31, figure 2, plate 36

Mesocnus torrei MATTHEW, 1931, p. 3.

HOLOTYPE

A.M.N.H. No. 16879. Lower jaw, the symphysis and left ramus with all the teeth, but the condyle, angle, and coronoid process incomplete.

HYPODIGM

A.M.N.H. Nos. 16879 (the type); 49927, right humerus; 49923, left astragalus; and 49928, right M_2 .

M.P.U.H. Nos. 1670, lower jaw, the symphysis, anterior part of the left ramus with M_1 ("caniniform" tooth), incomplete right ramus with alveoli of M_1 , M_{3-4} , and with M_2 preserved; 1671, distal end of left humerus; and 1672, right M_2 .

LOCALITY

All from Casimba, Sierra de Jatibonico. C. de la Torre collection.

DIAGNOSIS

(W. D. M.)

A smaller [and less robust] species, molar teeth relatively smaller, and M_3 with posterior and internal faces merged into a single convex face.

(C. P. C.)

DISCUSSION

This species is very similar to the genotype, *Mesocnus browni*, in all its known parts. It is based on a partial lower jaw, less robust than the type mandible of *M. browni*, with molar teeth relatively smaller and M_3 slightly different in cross section.

The humerus ascribed to this species is also much smaller and relatively less robust than that of the specimens referred to *M. browni*, but is similar to it in all its structural features.

The astragalus also is indistinguishable from what is known of the astragalus of *M. browni* in all its details. It is, however, much smaller than that of the type species and is of appropriate size to be assigned to *M. torrei*. This bone is represented by one almost complete specimen, the following description of which probably applies to the incompletely known astragalus of *M. browni*.

The astragalus is somewhat similar to that of the mylodonts and megatheres and differs markedly from the astragali of *Hapalops*, *Megalonyx*, *Megalocnus*, and *Acratocnus*. The most striking difference from the astragali of these four genera is seen on its dorsal or tibial surface which is divided into two parts directly connected to each other, the angle between the two being about 90 degrees. The inner part is formed by a prominent odontoid process, which is directed inward and upward, the outer part being low, semicircular around the odontoid process, and almost flat or gently convex on its dorsal or articular surface, as in *M. browni*, but much less convex than in the Miocene genera and even than in *Megalocnus* and *Megalonyx*. It is much larger than the inner odontoid process in longitudinal diameter and somewhat wider than the latter in transverse or dorsoplantar diameter. It somewhat resembles the outer articular surface on the astragalus of the Mylodontidae and Megatheriidae, and its relations with the odontoid process are also much as in those two families. This structure indicates a natural torsion of the tarsus, as is seen in the mylodonts, megatheres, and, among the megalonychids, in *Nothrotherium*. The foot therefore rested on its outer side. The neck of the astragalus is very short, even somewhat

shorter than in *Hapalops*. The navicular facet is ovate in outline, vertically set on the front of the neck, slightly concave distally, and arising to a level slightly lower than the inner articular process for the tibia. Its greater diameter is vertical, instead of transverse as in the Miocene Megalonychidae, or obliquely set as in *Megalocnus*. The cuboid facet is small, convex, placed just below the lower external side of the navicular facet and connected with the latter, the angle between the two facets being about 120 degrees. In the Miocene forms, e.g., *Hapalops*, the cuboid facet is on the plantar face of the neck instead of being on the external side. The fibular facet is not so large and not so elongate anteroposteriorly as in the Miocene forms, and is roughly triangular in outline, instead of being crescentic as in the latter. It is gently convex anteroposteriorly and flat transversely, and is continuous with the outer tibial facet with which it forms an angle of about 90 degrees. It is broad anteroposteriorly on its upper part, but becomes progressively narrower towards the calcaneal border. It is very similar in morphology and position to the fibular facet on the astragalus of the megatheres and mylodonts. The external calcaneal facet (ectal) is about as wide and as concave as in *Hapalops*, but much more elongate, and parallel to the proximo-distal axis, as in *Megalocnus*, instead of being obliquely placed, relative to the same axis, as in *Hapalops* and *Megalonix*. The sustentacular facet is lacking, but it seems that it was similar, in form and position, to that of *Megalocnus*. These two calcaneal facets are completely separated from each other by a moderately wide sulcus talis, as in *Hapalops*, *Megalocnus*, *Lestodon*, and the Megatheriidae.

The type lower jaw, the lower teeth, and the other referred bones of *Mesocnus torrei* are so similar to those of *M. browni*, that the hypothesis that these two forms are synonyms could perhaps be advanced. On that hypothesis *M. torrei* would be based on remains of young individuals of *M. browni*, which occurs abundantly in both the Ciego Montero and the Casimba collections, while *M. torrei* occurs in the Casimba collection only and is scarce there. But a humerus from the Casimba locality, ascribed to *M. torrei* be-

cause of its slenderness and much smaller size in comparison with humeri referred to *M. browni*, has both the proximal and distal epiphyses completely fused with the body of the bone, which is an almost certain indication that the bone came from an adult individual much smaller than *M. browni*. This fact, together with the other differences mentioned in the diagnosis, is favorable to the specific separation of *M. torrei* and *M. browni*.

It is hoped that future discoveries of more complete and associated specimens may confirm this view.

Measurements of the type specimens and of some of the referred specimens are given in tables 22, 23, and 27.

(C. P. C.)

ACRATOCNUS ANTHONY, 1916

Acratocnus ANTHONY, 1916, p. 195. WINGE, 1923, p. 313. MILLER, 1929a, p. 26. HOFFSTETTER, 1925, pp. 101-102.

Miocnus DE LA TORRE AND MATTHEW, 1915, p. 152 (*nomen nudum*). MATTHEW, 1918, p. 660 (*nomen nudum*); 1919a, p. 168; 1931, p. 3.

GENOTYPE

Acratocnus odontrionus Anthony, 1916.

DISTRIBUTION

Pleistocene. Puerto Rico, Haiti, and Cuba.

DIAGNOSIS¹

Size medium. Upper "caniniform" teeth trigonal, curved, and lower "caniniform" teeth semilunate in cross section, moderately procumbent, obliquely worn, the postero-internal face flat, not concave or grooved as in the other three genera, both wider apart than in *Mesocnus*, much more separated from each other than in *Megalocnus*. M_{2-5}^{2-5} roughly subquadrangular or elliptical in cross section. Strong and large preorbital fossa, sharp and high sagittal crest. Rostrum short, abruptly depressed from the anterior end of frontal forward, and very enlarged anteriorly to M^2 . Postorbital process strong, roughly conical, immediately followed by strong constriction of the parietals. Lower jaw short, massive. Symphyseal tongue short, quite different from that of *Mesocnus*, roughly pointed in-

¹ Modified from Matthew (MS) and Anthony (1916). (C. P. C.)

TABLE 28

MEASUREMENTS (IN MILLIMETERS) OF THE MANDIBLE AND LOWER TEETH OF *Acratocnus antillensis*

	A.M.N.H. No. 16880, Type	A.M.N.H. No. 16881, Paratype	M.P.U.H. No. 1673
Depth of mandible at posterior end of symphysis	34	—	34
Depth of mandible at posterior end of symphysis, outside M ₂	34	—	45a
Length of symphyseal tongue	17	—	—
Diastema between M ₁ and M ₂	13.5	—	16
"Caniniform" tooth (M ₁)			
L	13.5a	—	10.5
W	7.5a	—	6a
M ₂			
L	8a	—	8.5
W	12a	—	12.2
M ₃			
L	8a	9.5	8.5
W	13a	13.6	13
M ₄			
L	9a	11	—
W	11.5a	13	—

stead of spatulate, not decurved, and much less rugose at the tip, the inferior face with a rounded median ridge, different from the sharp crest of *Mesocnus*. Anterior mental foramen small, in contrast to that of *Mesocnus*. Condylar region raised moderately high above dental level, but not so high as in *Megalocnus*; angle at or below the level of dental row; flat upper surface rolled downward at the inner end. Coronoid process low, broad. Dental foramen slightly above alveolar border. Humerus with entepicondylar foramen.

DISCUSSION

A more detailed comparison with *Acratocnus* showed that this Puerto Rican form and the Cuban *Miocnus* are one and the same genus, as was suggested by Matthew (1919a, p. 168). The Cuban species is, however, different from the genotype in several respects, as is shown below.

(C. P. C.)

Acratocnus antillensis (Matthew, 1931)

Plate 37, plate 38, figures 4–6, plate 39, figure 2, plate 40, figure 2, plate 41, figures 1, 3, plate 42, figures 1, 3; text figure 3

Miocnus antillensis MATTHEW, 1931, p. 4.

HOLOTYPE

A.M.N.H. No. 16880. A lower jaw lacking condylar and angular regions, and with the alveoli of the teeth.

LOCALITY

Casimba, Sierra de Jatibonico. C. de la Torre collection.

PARATYPE

A.M.N.H. No. 16881. Left ramus of lower jaw, broken off at alveolus of M₂, but with

TABLE 29

MEASUREMENTS (IN MILLIMETERS) OF THE HUMERUS OF *Acratocnus antillensis* (A.M.N.H. No. 49940)

Length	162
Length of head	23.5
Width of head	23.5
Width of proximal end	40.5
Length of greater trochanter	17.5
Width of bicipital fossa (notch)	10
Width of diaphysis (shaft)	20
Length of diaphysis	17
Width of distal end	57
Width of trochlea	31
Depth of trochlea	16
Width of entepicondylar bridge	14.5

TABLE 30

MEASUREMENTS (IN MILLIMETERS) OF THE ULNA
OF *Acratocnus antillensis*
(M.C.A. No. 10190)

Length	—
Depth of greater sigmoid cavity	21.5
Greater length of olecranon	21
Lesser length of olecranon	16.8
Width of olecranon	16
Length of shaft (anteroposterior diameter)	17.5a
Lesser diameter of great sigmoid notch	13
Width of sigmoid notch	20.8

condylar and angular regions nearly complete
and M_{3-4} present.

HYPODIGM

Besides the types, the following specimens:
A.M.N.H. Nos. 49934, right upper "canini-
form" tooth (M_1), and 49935, left lower
"caniniform" tooth (M_1), both from Casimba;
49936, left lower "caniniform" tooth (M_1);
49937, two lower molars, both from Ciego
Montero; 49938 and 49939, four lower molars;
49940, right humerus; 49941, left tibia;
49944-49946, right femur and fragment of a
left one, right astragalus; and 49947, right
calcaneum, all from Casimba. A.M.N.H.
Nos. 49938 and 49944 are doubtfully ascribed
to this species.

M.P.U.H. Nos. 1673, anterior part of
lower jaw with symphyseal region, small part
of right ramus, broken at the alveolus of M_4 ,
with alveolus of the "caniniform" tooth (M_1),
and M_{2-3} preserved, and 1674, right lower

TABLE 32

MEASUREMENTS (IN MILLIMETERS) OF THE TIBIA
OF *Acratocnus antillensis*
(A.M.N.H. No. 49941)

Length	136
Length of proximal end	48
Width of proximal end	52.5
Width of popliteal notch	12.5
Length of diaphysis	16
Width of diaphysis	20
Length of distal end	25
Width of distal end	39
Length of distal articular surface	23.7
Width of distal articular surface	23.3

"caniniform" tooth (M_1), both from Ciego
Montero.

M.C.Z. No. 10190, right ulna, lacking the
distal half, Sierra de Jatibonico, Moreno col-
lection.

M.N.R.J. No. 2008-V, left lower "canini-
form" tooth (M_1) from Ciego Montero.

DIAGNOSIS

A species apparently somewhat more
robust than *A. odontrignonus*. Lower jaw with
relatively elongate, pointed, somewhat de-
curved symphyseal tongue. Antero-inferior
part of symphyseal region slightly concave
under the tongue, becoming flat from the
proximal end of tongue to the distal end of
symphysis. Masseteric fossa strong and deep.
Teeth relatively large. Humerus somewhat
slender, with smooth deltoid and pectoral

TABLE 31

MEASUREMENTS (IN MILLIMETERS) OF THE FEMORA OF *Acratocnus antillensis*

	A.M.N.H. No. 49944	M.C.Z. (no number)
Length	125	144
Distance between greater and lesser trochanters	45.2	50
Length of neck	12.5	12.5
Width of head	20.3	23.5
Width of proximal end	40	46.2
Width of distal end	37.6	42
Width of shaft	25	34
Width of trochlea	16	19
Width across condyles	35	34.8
Vertical extent (depth) of inner condyle	20	22
Width of intercondyloid notch	12	8

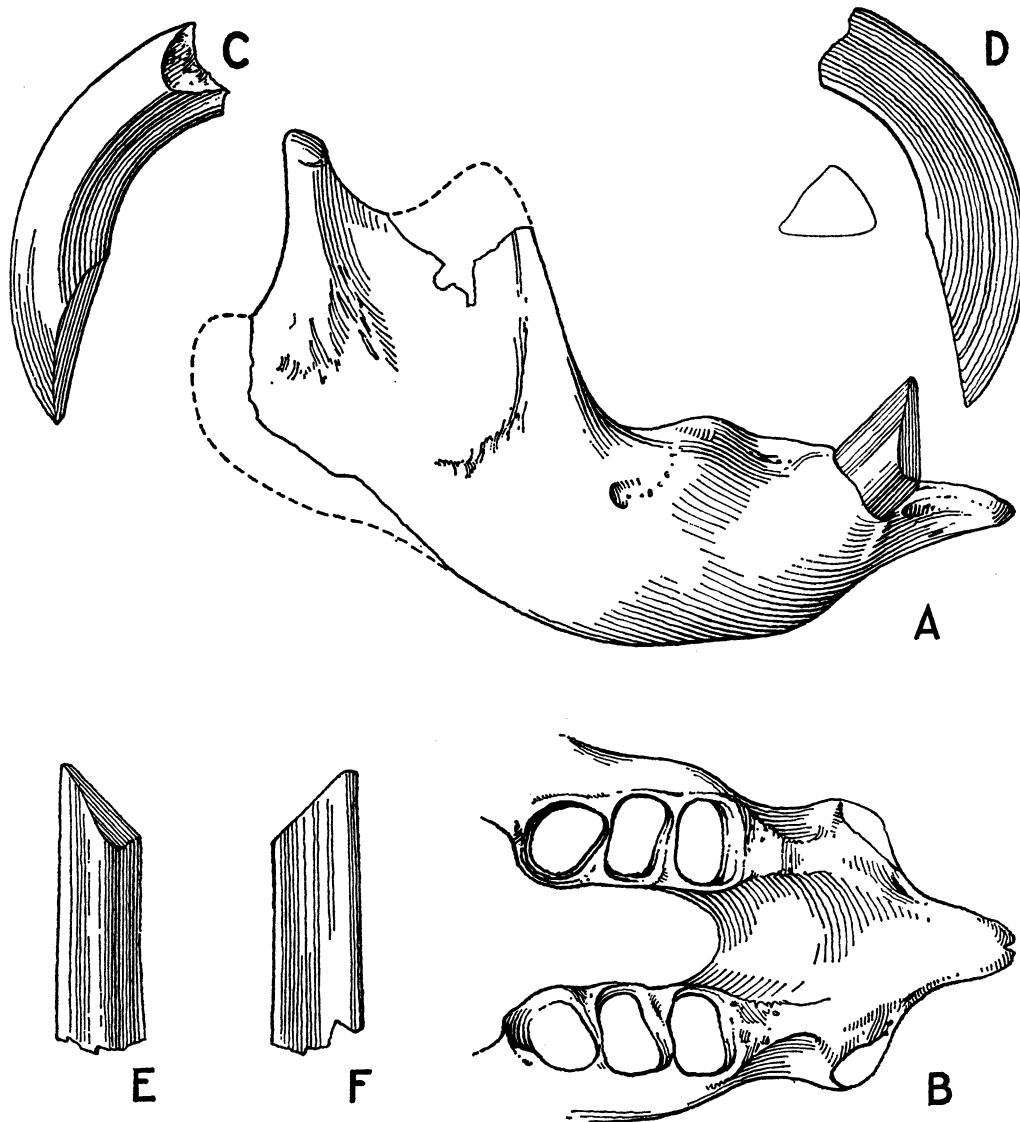


FIG. 3. *Acratocnus antillensis* (Matthew, 1931). A, B. A.M.N.H. No. 16880, type lower jaw, external side view of mandible (with "caniniform" tooth restored) and top view of dental region. C, D. A.M.N.H. No. 49934, right upper "caniniform" tooth (M^1). C. Internal side view. D. External side view. E, F. M.P.U.H. No. 1674, right lower "caniniform" tooth (M_1). E. External side view. F. Internal side view. Casimba, Sierra de Jatibonico. All $\times 5/6$.

ridges, shorter and more massive entepicondyle, and relatively narrower distal end.

(W. D. M.)

Upper jaws are not positively referable to [*A. antillensis*]. An upper ["caniniform" tooth (M^1) and four lower ones (M_1)] are referable. The upper canine ["caniniform" tooth] is startlingly like the canine teeth of a

peccary and, indeed, was at first thought to be such. [It] is sharply triangular in cross section, strongly curved, and obliquely worn on the posterior face. The lower tusks are of semicircular [or semilunate] cross section, obliquely worn at the ends, . . . the external hard layer of dentine tending to peel off from the surface and very suggestive of true enamel. They fit accurately in the sockets of

TABLE 33
MEASUREMENTS (IN MILLIMETERS) OF THE
ASTRAGALUS OF *Acratocnus antillensis*
(A.M.N.H. No. 49946)

Length	43
Width	26.5
Depth	20.5
Length of articular surface of tibia	29
Width of articular surface of tibia	22.5
Length of sustentacular facet	17
Length of ectal facet	14a

the type jaw of *Miocnus* [holotype of *A. antillensis*].

The form, size, and wear of the canines ["caniniform" teeth] and the general [aspect and] proportions of the [lower] jaw in this genus [form] are very like those of *Choloepus*. The molar [cheek] teeth, however, are different, being transversely oval-subquadrate instead of longitudinally oval as in *Choloepus*.

(C. P. C.)

DISCUSSION

A humerus of suitable size and aspect is referred to this species for reasons stated above.

The tibia assigned to this species differs from that of *A. odontrigonus* in only a few small and insignificant details. Its size is about the same, but it is somewhat more robust.

The same may be said of the astragalus and calcaneum, those of *A. antillensis* having the articular parts relatively more expanded laterally.

Two femora in the collection of the American Museum of Natural History, one incom-

TABLE 34
MEASUREMENTS (IN MILLIMETERS) OF THE CAL-
CANEUM OF *Acratocnus antillensis*
(A.M.N.H. No. 49947)

Length	54
Width of articular end	33.5
Length of tuber calcis	30a
Width of tuber calcis	12a
Length of sustentacular facet	10
Width of sustentacular facet	18.5
Length of ectal facet	8
Width of ectal facet	14

plete, are doubtfully referred to *A. antillensis*. They resemble the femur of *A. odontrigonus* but are relatively wider and shorter, with weaker great trochanter, stronger lesser and third trochanters, and much wider fossa intercondyloidea. They are very different in shape from the femur of *Megalocnus* and from that ascribed to *Mesocnus*. They are much smaller than the femur of *Megalocnus rodens* and smaller than that of *Mesocnus*; but they are too large to fit with the tibiae referred to *Microcnus*. They are assigned to *Acratocnus antillensis* by exclusion, although they do fit with the size of the tibia surely referred to this species, which is much larger. Among the doubtfully referred specimens there are, however, three fragmentary tibiae much smaller than the almost complete tibia surely assigned to this form, but morphologically indistinguishable from it. These tibiae probably belonged to smaller individuals of *Acratocnus antillensis*, along with the small femora mentioned above.

Measurements of the type specimens and of some of the referred specimens are given in tables 28 to 34.

(C. P. C.)

MICROCENUS MATTHEW, 1919

Microcnus DE LA TORRE AND MATTHEW, 1915, p. 152 (*nomen nudum*). MATTHEW, 1918, p. 660 (*nomen nudum*); 1919a, p. 168; 1931, p. 4.

GENOTYPE

Microcnus gliriformis Matthew, 1931.

DIAGNOSIS

(W. D. M.)

Anterior tooth [M_1] grooved postero-internally. Molars subquadrate, not oblique, grooved on inner and outer sides. Condyle little elevated above tooth row. Symphysis short, tongue vestigial.

(C. P. C.)

Microcnus gliriformis Matthew, 1931

Plate 38, figures 1-3

Microcnus gliriformis MATTHEW, 1931, p. 4.

HOLOTYPE

A.M.N.H. No. 16882. Right ramus of mandible with two last molars and alveoli of the "caniniform" tooth (M_1) and of M_2 .

TABLE 35

MEASUREMENTS (IN MILLIMETERS) OF THE RIGHT
RAMUS OF THE MANDIBLE OF THE TYPE OF
Microcnus gliriformis (A.M.N.H.
No. 16882)

Diastema between lower "caniniform" tooth (M_1) and M_2	5
Lower teeth series	29a
M_2 -4	22.5
M_3	
L	5
W	6
M_4	
L	6
W	7

LOCALITY

Casimba, Sierra de Jatibonico. C. de la Torre collection.

HYPODIGM

A.M.N.H. Nos. 49948, posterior fragment of left ramus of mandible with angular region partially preserved and the condyle preserved; 49942, incomplete tibia; 49943, four fragmentary humeri; 49949, left radius, lacking proximal end; 49950, proximal fragment of right ulna; 49951, two left and one incomplete right atragali; and 49952, left metacarpal III.

M.P.U.H. No. 1675, three fragmentary humeri.

All from Casimba, Sierra de Jatibonico. C. de La Torre collection.

DIAGNOSIS

The only known species of the genus.

DISCUSSION

(W. D. M.)

[This species is of very small size. Its] last lower molar [M_4] is somewhat longer than wide, subquadrate, [with] a distinct but narrow and shallow groove on each side. [M_3 is shorter than M_4], also grooved on both sides but the outer groove [is settled] near the postero-external corner, and the external side in front of it is strongly convex. [M_2 , judging by the alveolus, was] rounded, subtrigonal in cross section and [about the size of M_4 . Short diastema separates the "canini-

form" molar (M_1) from M_2 . The "caniniform" molar (M_1) was probably much like that of *Megalocnus*, but not so broad, relatively, judging by the preserved part of the alveolus.] The symphysis is quite short and wide, shaped as in *Megalocnus*, the symphyseal tongue [being apparently] absent. The lower border of the jaw [mandible] is only moderately convex beneath the molars. The posterior portion of the the jaw [mandible] is singularly like that of certain rodents, especially *Paramys*, [and somewhat like that of the Santacruzian forms and *Megalonyx*. The angular process is broad, flat, thin, prolonged backward, similar in shape and proportions to that of *Hapalops*, *Schismotherium*, and similar forms, relatively longer than in *Megalonyx*, shorter and much higher than in *Nothrotherium*, and slightly inflected inward]. The condyle is transversely expanded, set upon a long, [narrow] neck, [its] glenoid facet facing superiorly, nearly flat anteroposteriorly, and rolling down on the inner side to a nearly vertical plane. . . . The coronoid process is triangular, thin, somewhat higher than the condyle and separated from it by a broad, deep, rounded notch, the anterior border of

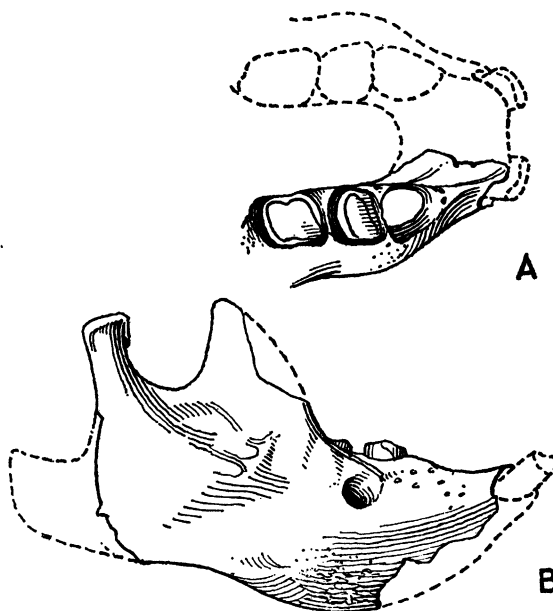


FIG. 4. *Microcnus gliriformis* Matthew, 1931. A.M.N.H. No. 16882, type right lower jaw. Casimba, Sierra de Jatibonico. $\times 1$.

the process springing from a point just behind M_2 [M_3]. The posterior mental foramen is [placed] beneath M_2 [M_3] and near the alveolar border. The dental foramen is [settled] beneath the broad notch just mentioned and somewhat below [the dental level].

(C. P. C.)

Except for the posterior fragment of left lower jaw, the other referred specimens are doubtfully ascribed to *Microcnus*. This reference is made by exclusion, because the specimens, aside from being of suitable size for *Microcnus*, are distinct in shape and in size from the homologous elements in the skeleton of the larger forms.

(W. D. M.)

The humerus... is rather short and abruptly expanded at the end, with entepicondylar foramen placed as in the Gravigrada [Megatheroidea], different from the elongate, gradually expanding distal end seen in tardigrades [Bradypodoidea].

(C. P. C.)

The radius is very like that of *Acratocnus*

but is smaller and relatively much more slender, particularly its distal half.

The tibia also closely resembles that of *Acratocnus* but is slender. The fibular facet and, to less degree, the tendinal process that projects from the inner side on its distal end are much smaller.

(W. D. M.)

The astragalus is singularly like that of the tree sloths, especially *Bradypus*; it is distinguished from that of any ground sloth by possessing a fairly distinct neck instead of a sessile head; the trochlea is narrow and the fibular facet deeply excavated as in the tree sloths.

(C. P. C.)

Metatarsal III is broad and somewhat short and heavy. It is about three-fifths as large as the homologous element in the Santacruzean (Miocene) genus *Peleciodon*. The similarity is so great that this bone is practically a miniature of the metatarsal III of *Peleciodon*, the morphological differences between them being only in small, almost insignificant structural details.

Measurements of the type specimen are given in table 35.

AFFINITIES OF THE CUBAN GROUND SLOTHS

(W. D. M.)

THE INCISOR-LIKE FRONT TEETH of *Megalocnus* are unique among edentates and might well suggest at first thought that we are dealing with a distinct family of ground sloths. But it must be remembered that these pseudo-incisors are not functionally gnawing teeth but approximated caniniform tusks in their interaction, much more like the shearing tusks of pigs and oreodonts than the gnawing incisors of rodents, and are not fundamentally different in action from the "canine-molars" of the normal sloths, although subserving a somewhat different purpose. The distinction is one of position and form, to some extent of function, but not of fundamental construction. Its taxonomic value may be equal to the difference in corresponding parts between *Euchloeops* and *Hapalops*; not in my opinion to the differences between *Megalonyx* and *Myiodon* molars.

All the genera have the first upper and lower teeth well developed, widely separated from the cheek teeth, and of caniniform or incisiform type. This is also seen in *Euchloeops*, *Megalonychotherium*, and *Megalonyx*. *Megalocnus*, *Mesocnus*, and *Microcnus* have a peculiar type of canine, unknown elsewhere among the Gravigrada [Megatherioidea] but approached to some degree by *Megalonyx*. In *Acratocnus*¹ the construction of the canines resembles that of *Choloepus*, *Euchloeops*, and *Megalonychotherium*.

Megalocnus and *Mesocnus* have a peculiar oblique setting of the molars, paralleled also in *Megatherium* and the scelidotheres. There is no sign of this in *Acratocnus* or *Microcnus*.

Megalocnus, *Mesocnus*,² and *Acratocnus* have the basifacial plane greatly depressed.

Megalocnus and *Microcnus* have the symphyseal tongue reduced to a vestige. In *Acratocnus* it is short, in *Mesocnus* elongate much as in the Miocene genera. It is absent in the Pleistocene ground sloths except *Nothrotherium*, *Megatherium*, and their relatives.

In *Microcnus* the construction of the molars suggests those of *Megatherium* and also the Pliocene (Paraná) genus *Octomyiodon*, although the specialization is not carried so far as in these genera. The Monte Hermoso astragalus described by Ameghino under the name of *Pathymotherium* is said to approach that of the tree sloths, but comparison of Ameghino's detailed description with the astragalus referred to *Microcnus* reveals no especial resemblance.

Pliomorphus bears some suggestion of affinity to *Megalonyx* but none of a closer kind to these genera.

The canines of *Acratocnus* are like those of *Choloepus hoffmani*.

Comparisons with *Nothrotherium* are limited to the retention of certain common primitive (Miocene) megalonychid characters, the Cuban genera having developed on diverse lines.

Megalocnus represents a type widely different from any of the gravigrades [Megatherioidea] hitherto known. It might perhaps be accorded family distinction if it stood alone. As it is associated with other genera more nearly approaching the normal megalonychid type and represents evidently an extreme specialization of that type, I have thought it better to regard this group of Cuban genera as a subfamily of the Megalonychidae.³

¹ Matthew's manuscript says: "In *Miocnus* and in the closely related Porto Rican genus *Acratocnus* the construction . . ." But, as pointed out above, I think that *Miocnus* and *Acratocnus* are one and the same genus, *Acratocnus* having priority of publication and being the valid name for the genus. In the following sentences of Matthew's text, therefore, the name *Miocnus* has been replaced by *Acratocnus*, without typographic indication of the change. (C. P. C.)

² Matthew refers only to *Megalocnus* and *Miocnus* (= *Acratocnus*) in this part of the text, but, as we have seen, *Mesocnus* also has the basifacial plane greatly depressed relative to the basicranial plane. (C. P. C.)

³ As was shown by Kraglievich (1922, pp. 73-87; 1923, pp. 1-56), the family Megalonychidae is polyphyletic, four subfamilies having been included in it by that paleontologist: Megalonychinae, Megalocninae, Orthotheriinae, and Nothrotheriinae. This arrangement was adopted by Simpson (1945, pp. 69-70, 192), with strong doubts regarding the recognition and contents of the proposed subgroups (e.g., Orthotheriinae) but taking into consideration the fact that Kraglievich, certainly a very good observer, "is the only recent authority who has gone over most of this superfamily in recent years with a broad knowledge of literature and of specimens," and also because the classification of the enormous variety

All the Cuban genera appear to be derivatives of a single Tertiary type, allied to *Euchloeops* and *Megalonychotherium*. The peculiar oblique swing of the molars in *Megalocnus* and *Mesocnus* is very suggestive of *Nematherium* and the scelidotheres, but in other respects this genus is remote. To a slight extent the same obliquity is seen in *Analcimorphus leptocephalus*. This primitive type had the normal elongated skull, basifacial and basicranial axes parallel and approximate, molars quadrate-oval, not obliquely set, the anterior teeth caniniform, well separated, moderately large, the upper pair oval, the lower semicircular in cross section, and lower jaw with a symphyseal tongue, inferior border convex, condyle normal. From this primitive type, which is most nearly represented among known genera by *Megalonychotherium* and *Euchloeops*, the four Pleistocene genera are derivable by divergent specialization.

of the genera in a single subfamily, if the Megalonychidae were considered as a simple subfamily of the Megatheriidae as was proposed by Stock (1925), would be contrary to the consensus and embarrassing to the taxonomist.

I also think that the enormous variety of the genera in the Megalonychidae gives, indeed, good indication of the polyphyletism of the family and therefore shows that its subdivision into a number of subfamilies agrees better with the real phyletic conditions of the group.

Therefore, following Kraglievich's and Simpson's views, although not at all disregarding Matthew's opinions on this subject, which were expressed at a time when the knowledge of the entire group of the megalonychids was not so good as it is today, I think that the following classification is, at least for the present, the most approximate expression of the real affinities of the West Indian ground sloths:

- Order EDENTATA Cuvier, 1798
 - Suborder XENARTHA Cope, 1889
 - Infraorder PILOSA Flower, 1883
 - Superfamily MEGATHERIOIDEA Cabrera, 1929
 - Family MEGALONYCHIDAE Zittel, 1892
 - Subfamily ORTOTHERIINAE Kraglievich, 1923
 - Acratocnus* Anthony, 1918 (= *Miocnus* Matthew, 1919)
 - Mesocnus* Matthew, 1919 (= *Parocnus* Miller, 1930, in part?)
 - Subfamily Megalocninae Kraglievich, 1923
 - Microcnus* Matthew, 1919
 - Megalocnus* Leidy, 1868 (= *Myomorphys* Pomel, 1868 = *Parocnus* Miller, 1930, in part?)
- The synonymies, except for *Myomorphus*, are proposed by me. (C. P. C.)

In *Mesocnus* the lower pair of front teeth is concave postero-internally, the upper pair oval, the muzzle constricted, the symphyseal tongue long, decurved, and spatulate; the molar teeth have become obliquely set and assumed characteristic forms; in other respects it is nearest the primitive type.

In *Acratocnus* the jaw has become very short and robust, the symphyseal tongue is short, pointed, not decurved, and the molars are equal in size, round-quadrate, not oblique, wider than long.

In *Microcnus* the jaw is also short, but much less massive, deeper, and less convex under the molars; the front teeth are concave antero-internally, the molars subquadrate, M_3 [M_4] larger than M_2 [M_3], longer than wide, grooved on both sides, condyle low, angle broad, flat, and thin. *Microcnus gliriformis* is about as large as a woodchuck.

In *Megalocnus* the front teeth are closely approximated, concave postero-internally in both jaws and pseudo-[gnawing] in function; the muzzle is short, the basicranial and basifacial axes are at a sharp angle, and the condyle is raised high above the level of the tooth row. There is no symphyseal tongue. Molars round-quadrate, the last lower tooth the largest, the middle molars not obliquely set.

This is the most specialized genus of the group and includes the largest and most abundant species. The largest form, *M. rodens rodens*, is about the size of a black bear, comparing with some of the Pliocene ground sloths of the continent.

To understand the affinities of these genera a word is necessary as to the interrelationships of the several groups of ground sloths. The primitive type appears to be represented by *Hapalops* and its allies in the Santa Cruz [Santacruzian] fauna. These have simple, transversely oval or subquadrate molars, the first pair in either jaw somewhat smaller than the others, slightly spaced and oval in cross section. The skull is of moderate length, the palate and basicranial plane nearly continuous. The jugal is loosely united by suture to the maxillary, but free posteriorly, its upper and lower branches short, plate-like, imperfectly divided, approximating the zygomatic process of the squamosal but not united to it. From this primitive type are derived several

divergent specializations. In the Megatheriidae the molars have become quadrate, with a modification of the arrangement of the harder dentine layer so that it wears into two transverse crests, the dentigerous portions of the jaws are very deep, owing to the great vertical height of the grinders, and the front of the jaws in advance of the teeth is prolonged and decurved in a characteristic manner. In the scelidotheres the molars assume a characteristic oblique and trigonal cross section, the skull is elongate and prolonged in advance of the teeth but not decurved, and the dentigerous portion of the jaws remains comparatively shallow. In the Mylodontidae the posterior molars are specialized in a characteristic pattern, the skull is short, and the muzzle is large and more or less expanded into a broad bell shape.

Megalonyx is the only one of the large Pleistocene ground sloths that retains the primitive simple construction of the cheek teeth; the caniniform teeth are enlarged in this genus into large tusks, oval or submeniscoid in cross section. It also retains with but little change the primitive construction of the feet, which in the megatheres, scelidotheres, and mylodonts are greatly altered.

Eucholoeops and *Megalonychotherium* among the Santa Cruz [Santacruzean] ground sloths foreshadow the enlarged and tusk-like front teeth, sharply triangular in the former, somewhat more oval and less prominent laterally in the latter. These genera, together with *Megalonyx* and the four Cuban genera, constitute the megalonychine section or subfamily of the Megalonychidae.

In *Megalonyx* the zygoma has been reconstituted as a continuous and massive arch; in *Megalocnus* the jugal has specialized in a quite diverse and unique manner; in the smaller Cuban genera and in *Acratocnus*¹ it is unknown.

In *Megalocnus* and to some extent in all the Cuban genera, the basifacial axis is much below the level of the basicranial axis, a feature not seen in any other ground sloths, but characteristic of the glyptodonts.

In *Megalocnus*, *Mesocnus*, and *Microcnus* the tusks assume a meniscoid cross section

and are in varying degree approximated; to some extent this construction is approached in *Megalonyx*. In *Acratocnus*² the tusks have a sharply trihedral cross section, as in the Santa Cruz [Santacruzean] *Eucholoeops*; *Megalonychotherium* of the Santa Cruz [Santacruzean] appears to show some degree of approach towards the megalonychine type.

The limbs and feet of the Cuban genera, except *Microcnus*, are readily derivable from those of *Eucholoeops* and are even less modified, on the whole, than in *Megalonyx*. *Microcnus*, if the astragalus is correctly associated, approaches much nearer to the tardigrade [Bradypodoidea] type, but it would need much more evidence to say whether this indicates some degree of relationship or not. It is quite possible that the slender feet of the tree sloths are reversionary adaptations to a more purely arboreal life, and derived from a type of foot more like that of the known Santa Cruz Gravigrada [Santacruzean Megatherioidea], instead of representing a survival of a more primitive stage than these.

The following conclusions appear to be reasonably settled:

1. The [known] Antillean genera of edentates are all nearly related, although quite distinct generically, and belong to the megalonychine division of the primitive family Megalonychidae.³ They represent distinct divergent specializations from a common ancestral type, *Eucholoeops* or some nearly allied genus, from which *Megalonyx* is also independently derived.

2. These primitive Megalonychidae are the most abundant gravigrades [megatherioids] of the Santa Cruz [Santacruzean] and include two divisions: (a) *Hapalops* and its allies, from which the Megatheriidae are structurally derivable through *Planops* and *Analcietherium*, the mylodonts and scelidotheres through such types as *Nematherium*, and so on; (b) *Eucholoeops*, from which *Megalonyx* and the Antillean genera are derivable. The Megalonychidae are not found in South America after the Miocene,⁴ being replaced

² "In *Miocnus* and *Acratocnus* . . ." in Matthew's manuscript. (C. P. C.)

³ See note on page 47. (C. P. C.)

⁴ When Matthew wrote this sentence *Nothrotherium* and its closer allies, in the South American Pliocene and

¹ In *Acratocnus* the zygomatic arch was open, more or less as in *Megalocnus*. (C. P. C.)

by the more specialized mylodonts, scelidothers, and megatheres in the Pliocene and Pleistocene. In North America *Megalonyx* appears in the Pliocene¹ and Pleistocene, and *Megatherium* and *Myiodon*² in the Pleistocene.

3. *Megalonyx* must apparently be regarded as derived from a primitive forerunner of the edentate migration into North America, reaching this continent not later than the beginning of the Pliocene, at a time when some sort of barrier made intermigration difficult and restricted. A correspondingly scanty group of forerunners of the southward migration made their way into South America about the same time. Later on, about the beginning of the Pleistocene, an easier path was open for a more extended migration, which permitted *Myiodon*, *Megatherium*, *Chlamytherium*,³ *Nothrotherium*, *Glyptodon*, and the existing *Tatusia*⁴ to reach North America, while a flood of North American types poured into South America.

4. The forerunners of the intercontinental migration are the ancestors of *Megalonyx* and *Glyptotherium* passing northward, the ancestors of *Arctotherium*, certain Procyonidae, and probably certain Equidae (*Hippidium*, *Onhippidium*) passing southward. These may perhaps have been at the time resident in the tropical portions of their respective conti-

nents and first able to take advantage of a means of communication. The better known and widely distributed genera of the temperate portions of the two continents may have been slower to extend their range so as to pass over to the other continent, or unable to do so until the glacial epoch provided a sufficient cooling of the Central American bridge for them to reach and pass over it.

5. The West Indian ground sloth genera may all be derived from a single type, *Eucholoeops* or some near ally, that reached the Antilles in the Miocene or early Pliocene and there specialized into the several genera of the Pleistocene. Or it might be supposed that four unknown Central American or South American genera reached the islands at a later date, later Pliocene or Pleistocene. Against the latter hypothesis stands the fact that the five genera, while including perhaps a dozen species, belong to a single subfamily only out of the numerous and widely varied families of Edentata. Mylodonts, nothrotheres, megatheres, chlamytheres, and glyptodonts were presumably in Central America at this date. They were wide-ranging types, as they are found from Florida to California, and it seems improbable that five hypothetical ancestors, of the existence of which on the continent there is no evidence, should have reached the islands, while all of the real types of the existence of which on the continent there is real evidence, should have failed to reach the islands. This alternative, therefore, while it may seem plausible until one examines the circumstances, becomes highly improbable upon critical analysis. I conclude that the West Indian ground sloth genera are probably derived from a single invading ancestral type, which reached the islands in the early Pliocene, so far as one may judge from the structural diversity in its late Pleistocene descendants, and their structural relations to the progressive evolutionary stages of the Tertiary and Pleistocene history of their continental relatives.

Pleistocene, were considered as belonging to the Megatheriidae. Later studies showed that they are representatives of the Megalonychidae, subfamily Nothrotheriinae, and, therefore that this family was present in South America from the lower Miocene to the upper Pleistocene, at least. Nevertheless some authors still prefer to classify the Nothrotheriinae among the Megatheriidae (C. P. C.)

¹ The Pliocene forms are very imperfectly known and are certainly smaller, probably more primitive. (W. D. M.)

² *Eremotherium* and *Paramyiodon* are the North American genera. (C. P. C.)

³ *Pampatherium* is the valid name. The North American genus is *Holmesina*. (C. P. C.)

⁴ *Dasybus* is the valid name. (C. P. C.)

APPENDIX: NOTE ON BIOMETRY AND SYSTEMATICS

GEORGE GAYLORD SIMPSON

MATTHEW WORKED before the establishment of the new systematics, with its emphasis on populations and distribution of variation rather than on types. He was, nevertheless, one of the forerunners of this movement, and even his early work shows an awareness of wide variation as a usual characteristic of the natural populations that are species. He was, moreover, one of the first to insist that two or more closely similar or related but distinct populations are rarely found in the same place at the same time. A paleontological corollary, which was explicitly drawn by Matthew and perhaps for the first time, is that in a collection of unified origin (from a single fossil quarry, for instance) congeneric animals will generally be of a single species, or, if they are of more than one species, the discontinuity between the groups will be large and evident. In such a collection, then, in the absence of fairly obvious discontinuity, the variation within a genus should usually be taken as intraspecific. The variation of the species is given by the data, which are not to be subjected to *a priori* ideas as to how much variation is allowable. There are certainly some exceptions to this rule, but there is now little doubt that it is the rule.

That principle is here restated and the fact that we owe it to Matthew as much as to any one person is emphasized because of the surprising fact that Matthew himself did not apply it to the Cuban sloths. In the single genus *Megalocnus* he defined three species, and in one of them two subspecies, as all present together in the apparently quite unified *casimba* fauna. Paula Couto has (in my opinion, quite properly) reduced one of those supposed species (*M. "junius"*) to synonymy. He has tentatively recognized the other three taxa of Matthew, but has drawn attention to the possibility that they also may all be synonymous. That Matthew himself had doubts is evident in his letter to de la Torre, quoted on a preceding page. He there noted that his four *provisional* (my italics) taxa in *Megalocnus* "may be partly due to age and individual differences, although they can hardly be all referred to one species, for the

range in size is over 300 per cent, far more than in a series of different aged skulls of *Bradypus* and *Choloepus*." Matthew's "300 per cent" is here an *a priori* criterion and hence contrary to his own principle, although no one would quarrel with it if growth and sexual dimorphism were definitely excluded as significant factors. The comparison with the recent *Bradypus* and *Choloepus* does not sufficiently account for the possible influence of growth, because (a) we do not know (and it is indeed improbable) that the examined recent specimens covered as wide an age range as the specimens of *Megalocnus*, and (b) we do not know (and again it is improbable) that growth changes in available dimensions are comparable in *Bradypus* or *Choloepus* and in the much larger and quite differently proportioned *Megalocnus*.

It must thus be admitted that there is some weakness in Matthew's conclusions on this point. Matthew was aware of possible weakness here, and if he had been able to revise and complete his manuscript he might well have changed it, at least to the extent of reducing the supposed taxa in *Megalocnus* from four to two. Paula Couto, equally conscious of the problem, has asked me to make an independent check by biometric methods, although of course also aware that such methods cannot by themselves establish a definitive solution.

In the collections here studied specimens that can be shown beyond doubt to be completely adult (crania, vertebrae, and long bones with sutures completely closed or epiphyses fully fused) are much too few to permit reliable statistical discrimination of possibly separate populations. It is, nevertheless, noteworthy that observed differences in dimensions of such specimens do not even remotely approach Matthew's figure of 300 per cent (which therefore was not based on dimensions known to be of full-grown individuals). No adult specimens have been referred to the smallest two supposed species (*M. ursulus* and *junius*)—a fact highly suggestive in itself. The best comparisons available within *M. rodens* are for length of

TABLE 36

STATISTICAL DATA FOR WIDTH OF M_3 IN ALL SURELY ADULT AND PRECISELY MEASURABLE SPECIMENS REFERRED TO *Megalocnus rodens rodens* (N, 21) AND *Megalocnus rodens casimbae* (N, 3) COMBINED

Number of Specimens (N)	Mean (\bar{x})	Standard Deviation (s)	Coefficient of Variation (V)	Observed Range (O.R.)	Ratio of Upper to Lower Limits of Observed Range
24	21.7 \pm 0.3	1.45 \pm 0.21	6.7 \pm 1.0	19.0–23.8	1.25

humerus (eight specimens) and length of femur (nine specimens). For the humerus the ratio of largest to smallest is 1.39 and for the femur 1.53. These ratios are large for single populations of mammals, but not impossibly so, especially if there is any sexual dimorphism, a point on which there are no data for ground sloths. Moreover, Paula Couto points out on a previous page that the smallest specimens referred to *M. r. casimbae* are aberrant and may not belong in *Megalocnus*. If two specimens of such highly doubtful identification are omitted, the ratios of lengths of the largest specimens placed in *M. r. rodens* to the smallest placed in *M. r. casimbae* are only 1.29 for the humerus and 1.22 for the femur. Such figures are usual in single populations of mammals and do not in themselves suggest any taxonomic distinction even at a subspecific level.

Matthew's figure of 300 per cent (i.e., of a largest/smallest ratio of 3.00) and his recognition of more than one species in *Megalocnus* were based on the comparison of very early juvenile lower jaws and teeth with corresponding parts of the largest adults. The distributions of available measurements of these specimens may be exemplified by those of M_3 . That tooth provides the largest sample and was singled out in diagnosis of supposed species. Other distributions, although not always so clear in their smaller samples, are similar in pattern and consistent with conclusions based on M_3 , so that there is no reason to use space for presentation and discussion of more than the one example.¹

The data for M_3 are graphically summarized in figure 5. There is a single cluster of numerous specimens, and there are three

specimens that fall distinctly outside the cluster. The cluster appears to be a sample of a single population, with each of the two dimensions in an approximately normal distribution. The variation, as is further shown in table 36, is such as commonly occurs in fully homogeneous samples of single populations of mammals. The estimated coefficient of variation, 6.7, is quite usual for single subspecies, even for teeth that are, unlike these, rooted and therefore nearly constant in size in a given individual. Specimens referred to both *M. r. rodens* and *M. r. casimbae* are included, but neither the statistical data nor the graph suggests any difference between them.

The specimen (M.C.Z. No. 10163) at $L = 14.8$, $W = 16.5$ in figure 5, referred to *M. r. casimbae*, seems to be approximately adult and is well within the "cluster" range for length, but it is exceptionally narrow and has the minimal width/length ratio in all measured materials. If it is interpreted as representing a distinct taxon, that taxon is not *M. r. casimbae*. However, its deviation from the cluster is not so great that it could not be merely an extreme normal variant. It could equally well be a young adult in which tooth width had not yet reached the definitive adult size. There is some suggestion in the data on tooth dimensions that younger animals had relatively narrower teeth, or that definitive length was reached before definitive width, although there are not enough specimens to test the probability of this (developmentally quite logical) possibility.

The other two specimens outside the cluster are M.C.Z. No. 10164, referred to *M. r. casimbae*, and A.M.N.H. No. 49997, Matthew's type of *M. junius*, referred to *M. ursulus* by Paula Couto. (The type of *M. ursulus* has no teeth.) Both are plainly juveniles, the latter particularly young as

¹ All the raw data are available to the reader in Paula Couto's tables.

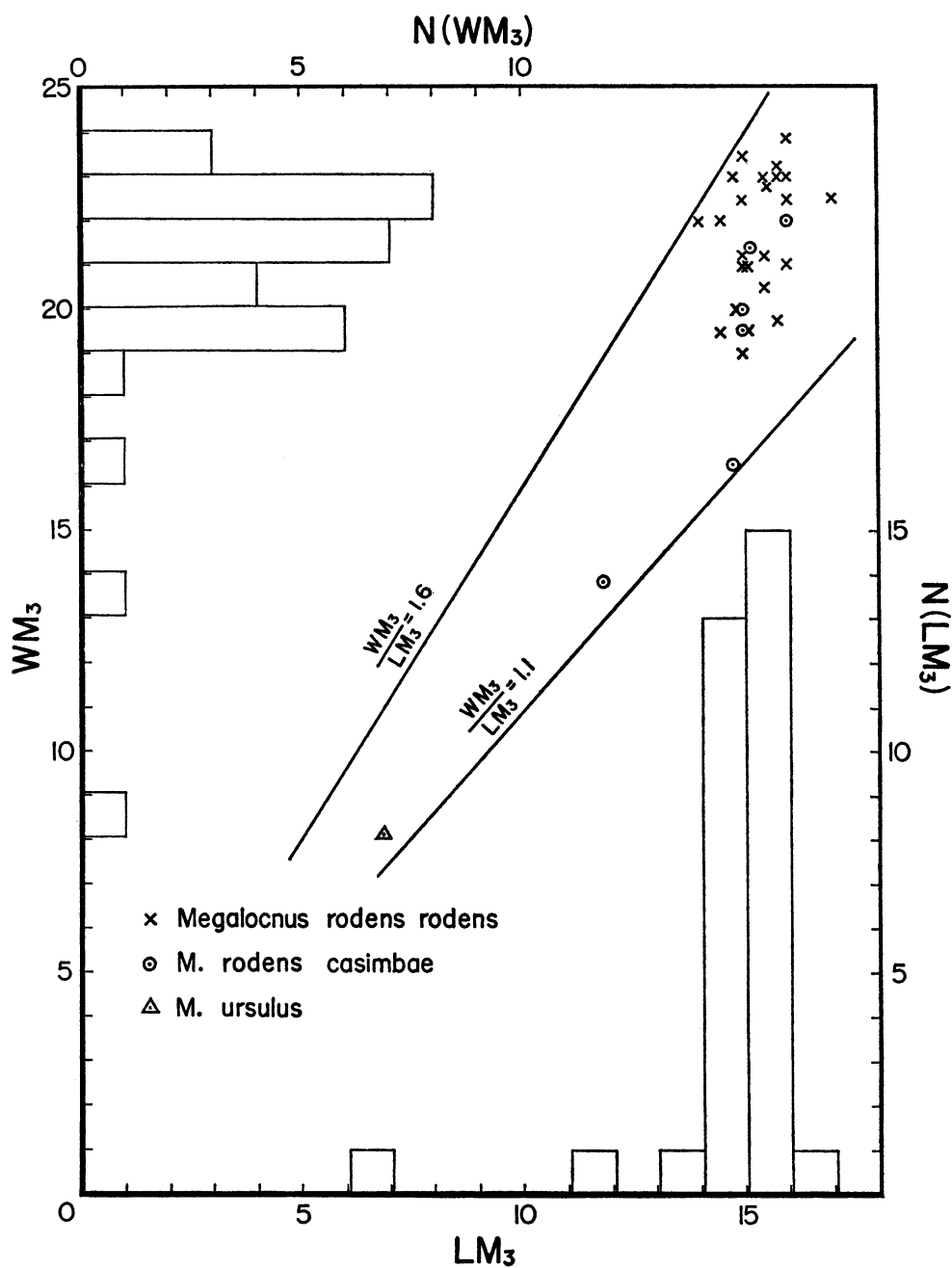


FIG. 5. *Megalocnus*. Distribution of horizontal dimensions of wear surfaces of M_3 on all available specimens. References to species and subspecies are as in the main text of this monograph. The lines are not fitted but represent the approximate limits of observed width/length ratios. The histograms are frequency distributions of width (upper left) and length (lower right); the corresponding frequency scales are at the top and right, respectively, of the graph.

suggested by the texture of the bone as well as the general aspect. In *Megalocnus* the teeth grew continuously throughout life. It is a mechanical necessity that the horizontal dimensions (hence the crown diameters on the wear surface) must have been very much smaller in a young individual than in an adult. There is, at least, no reason to suppose that the teeth of these juveniles would not have fallen within the adult cluster of the graph if the individuals had survived to adulthood. It is always possible that they would not have done so, and that these specimens do indeed represent taxa with smaller or otherwise different teeth and jaws. But, in the absence of any contrary evidence, both parsimony and probability favor the view that the juveniles are of the same taxon as the adults with which they were associated.

The whole picture suggested by this graph (and by all the other metrical data at hand) is that of a sample mainly of adults but with a few juveniles, all from a single population. The teeth (also the jaws and other bones) grew rather rapidly in the juveniles and changed somewhat in proportions. In adults, after the bones ceased to grow, the teeth continued to grow longitudinally (vertically) but no longer changed their horizontal dimensions significantly.

It is impossible to prove beyond any question and by biometrical means alone that a sample is taxonomically homogeneous. The data cannot establish the negative conclusion that Matthew's taxa are invalid. Nevertheless it seems fairly clear, as Paula Couto also indicates in the preceding text, that there is not sufficiently sound evidence of their validity. Establishment of a statistical difference between local populations, such as Matthew suggested between his *M. r. rodens* and *M. r. casimbae*, would require larger sam-

ples of definitely and precisely recorded provenience than are now available. Establishment of a specific difference, as suggested in *M. rodens*, *M. ursulus*, and *M. junius*, would require discovery of specimens of the same age and demonstration that they are not conspecific.

A less complex but otherwise similar problem is involved in the supposed sympatric occurrence of *Mesocnus browni* and *M. torrei* at the Casimba locality. (Only the commoner form, *M. browni*, is recorded from Ciego Montero.) Paula Couto points out that as far as teeth, jaws, and most other specimens are concerned *M. torrei* could well be merely juvenile *M. browni*. The data are so few that their further graphic or statistical analysis can add little or nothing to this suggestion. The probability is perhaps enhanced by the parallel case of *Megalocnus* in which *M. ursulus* is very likely juvenile *M. rodens*. However, Paula Couto also points out that among humeri surely adult and clearly referable to *Mesocnus* there are greater size differences than usually occur in single species. The maximum ratios are 1.45 for length, 1.60 for width of the head, and no less than 2.38 for width of the bicapital notch (which might, however, be expected to have great variability and perhaps to change even in adults). The small number of specimens involved (see table 23) makes the differences all the more impressive, because these ratios will in general be larger the larger the sample. Unless populations in this genus were exceptionally variable (for instance, had strong sexual dimorphism), the humeri do indeed suggest, although they do not prove, the presence of more than one species. It is not clear whether the jaw materials, including the types, can now be precisely sorted into the groups suggested by the humeri.

LITERATURE CITED

- ANTHONY, HAROLD ELMER
 1916. Preliminary report of fossil mammals from Porto Rico. *Ann. New York Acad. Sci.*, vol. 27, pp. 193-203, pls. 7-14.
 1918. The indigenous land mammals of Porto Rico, living and extinct. *Mem. Amer. Mus. Nat. Hist.*, new ser., vol. 2, pt. 2, pp. 333-435, pls. 55-74.
 1925. Mammals of Porto Rico, living and extinct—Rodentia and Edentata. Scientific survey of Porto Rico and the Virgin Islands. New York, New York Academy of Sciences, vol. 9, pt. 2, pp. 97-241, pls. 16-54.
- AMEGHINO, FLORENTINO
 1881. La antigüedad del hombre en el Plata. Paris and Buenos Aires, G. Masson and Igon Hermanos, vol. 2, pp. 1-557, pls. 17-25.
- BROWN, BARNUM
 [MS.] Annual report for the year 1911, to Dr. W. D. Matthew, curator of the Department of Vertebrate Paleontology, the American Museum of Natural History. [Unpublished], 16 pp.
 1913. Some Cuban fossils. *Amer. Mus. Jour.*, vol. 13, no. 5, pp. 221-228.
- CASTRO, MANUEL FERNANDEZ DE
 1864. De la existencia de grandes mamíferos fósiles en la Isla de Cuba. *An. R. Acad. Cien. Med. Fis. Nat. Habana*, vol. 1, pp. 17-21, 54-60, 96-107.
- HOFFSTETTER, ROBERT
 1955. Un megalonychidé (édenté gravigrade) fossile de Saint-Domingue (Île d'Haiti). *Bull. Mus. Natl. Hist. Nat., Paris, sér.* 2, vol. 27, no. 1, pp. 100-104.
- KRAGLIEVICH, LUCAS
 1922. *Amphiocnus paranense*, n. gen., n. sp., un probable precursor del "*Megalocnus*" de la Isla de Cuba en la formación entrerriana. *Physis*, Buenos Aires, vol. 6, pp. 73-87.
 1923. Descripción de dos cráneos y otros restos del género "*Pliomorphus*" Amegh. procedentes de la formación entrerriana de las Barrancas del Río Paraná. *An. Mus. Nac. Hist. Nat., Buenos Aires*, vol. 33, pp. 1-56, pls. 1-5 [With classification of Megalonychidae.]
- LEIDY, JOSEPH
 1855. A memoir on the extinct sloth tribe of North America. *Smithsonian Contrib. Knowl.*, vol. 7, pp. 1-70, pls. 1-16.
 1868. Notice of some vertebrate remains from the West Indian islands. *Proc. Acad. Nat. Sci. Philadelphia*, vol. 20, pp. 178-180.
- LYDEKKER, RICHARD
 1887. Catalogue of the fossil Mammalia in the British Museum (Natural History). Pt. 5. Containing the group Tillodontia, the orders Sirenia, Cetacea, Edentata, Marsupialia, Monotremata, and supplement. London, British Museum (Natural History), xxxv+345 pp.
- MATTHEW, WILLIAM DILLER
 1918. Affinities and origin of the Antillean mammals. *Bull. Geol. Soc. Amer.*, vol. 29, pp. 657-666.
 1919a. Recent discoveries of fossil vertebrates in the West Indies and their bearing on the origin of the Antillean fauna. *Proc. Amer. Phil. Soc.*, vol. 58, pp. 161-181.
 1919b. Affinities and origin of the Antillean mammals. *Bull. Geol. Soc. Amer.*, vol. 29, pp. 657-666.
 1931. Genera and new species of ground sloths from the Pleistocene of Cuba. *Amer. Mus. Novitates*, no. 511, pp. 1-5.
- MILLER, GERRIT S., JR.
 1929a. A second collection of mammals from caves near St. Michel, Haiti. *Smithsonian Misc. Coll.*, vol. 81, no. 9, pp. 1-30, 10 pls.
 1929b. Mammals eaten by Indians, owls and Spaniards in the coast region of the Dominican Republic. *Ibid.*, vol. 82, no. 5, pp. 1-16, 2 pls.
- OSBORN, HENRY FAIRFIELD
 1918. Observations on the skeletons of *Moropus cooki* in the American Museum. (Abstract.) *Bull. Geol. Soc. Amer.*, vol. 29, pp. 131-133.
- PAULA COUTO, CARLOS DE
 1956. On two mounted skeletons of *Megalocnus rodens*. *Jour. Mammal.*, vol. 37, no. 3, pp. 423-427.
- POMEL, NICOLAS AUGUSTE
 1868a. Sur le *Myomorphus cubensis*, sous-genre nouveau du *Megalonyx*. *Compt. Rendus Séances Acad. Sci., Paris*, vol. 67, no. 13, pp. 665-668.
 1868b. Note bibliographique additionnelle sur le *Myomorphus cubensis*. *Ibid.*, vol. 67, no. 13, p. 850.
- SCOTT, WILLIAM BERRYMAN
 1937. A history of land mammals in the Western Hemisphere. Revised edition, rewritten throughout. New York, the Macmillan Co., xiv+786 pp.

SIMPSON, GEORGE GAYLORD

1945. The principles of classification and a classification of mammals. *Bull. Amer. Mus. Nat. Hist.*, vol. 85, pp. 1-350.

TORRE, CARLOS DE LA

- 1910a. Osamentas fósiles encontradas en las casimbas de la Sierra de Jatibonico. *Rev. Fac. Letr. Cien., Habana*, vol. 10, pp. 77-88, 6 pls.

- 1910b. Investigaciones paleontológicas en las sierras de Viñales y de Jatibonico. [Original reference not seen. Cited by Paula Couto from a separate; reprinted from *Conf. Pronunc. Acad. Cien. Méd., Havana*, 33 pp.]

TORRE, CARLOS DE LA, AND W. D. MATTHEW

1915. *Megalocnus* and other Cuban ground-sloths. (Abstract.) *Bull. Geol. Soc. Amer.*, vol. 26, p. 152.

WILLIAMS, ERNEST

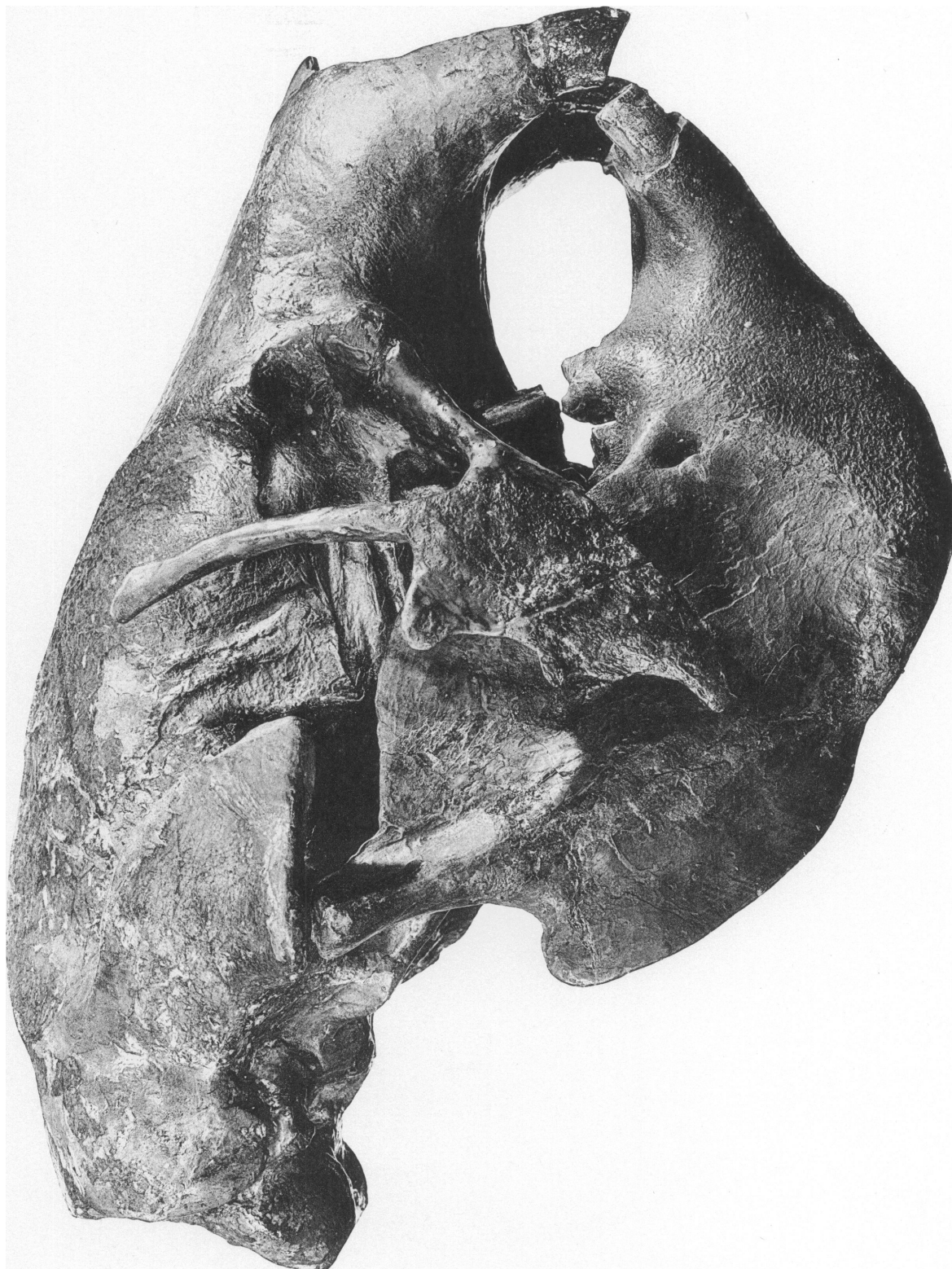
1950. *Testudo cubensis* and the evolution of Western Hemisphere tortoises. *Bull. Amer. Mus. Nat. Hist.*, vol. 95, pp. 5-36, pls. 1-7, 1 table.

WINGE, HERLUF

1923. *Pattedyr-Slaegter. I. Monotremata, Marsupialia, Insectivora, Chiroptera, Edentata*. Copenhagen, H. Hagerups Forlag, viii+360 pp., 1 pl.

ZITTEL, KARL A. VON

1894. *Traité de paléontologie*, Paris, Munich and Leipzig, C. Barrois, [etc.], pt. 1, vol. 4, 806 pp.



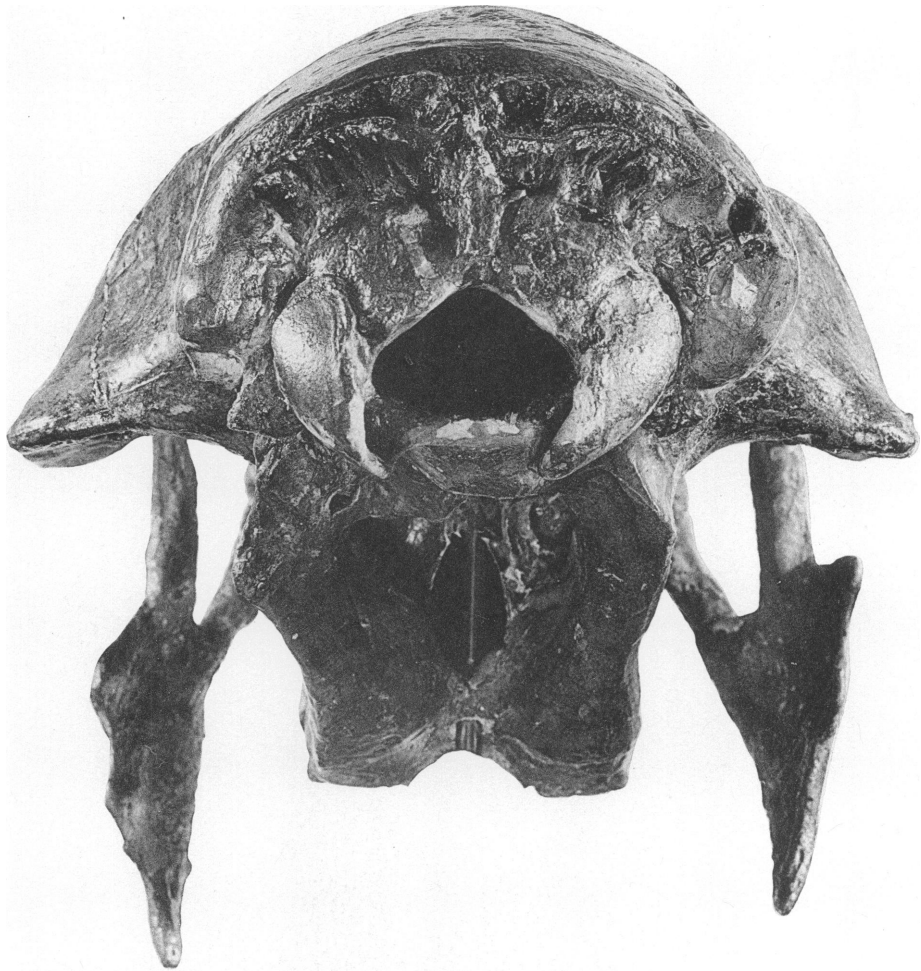
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 16876, skull and mandible of the mounted composite skeleton, right side view (zygoma restored). Ciego Montero. $\times \frac{3}{4}$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 16876, top view
(zygomata restored). Ciego Montero. $\times \frac{3}{4}$



Megalocnus rodens rodens Leidy, 1868. 1. A.M.N.H. No. 16876, palatal view. 2-5. Right M¹, A.M.N.H. No. 16884. 2. Posterior side view. 3. Anterior side view. 4. External side view. 5. Grinding surface view. Ciego Montero. All $\times \frac{3}{4}$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 16876, posterior side view (zygomata restored). Ciego Montero. $\times 4/5$



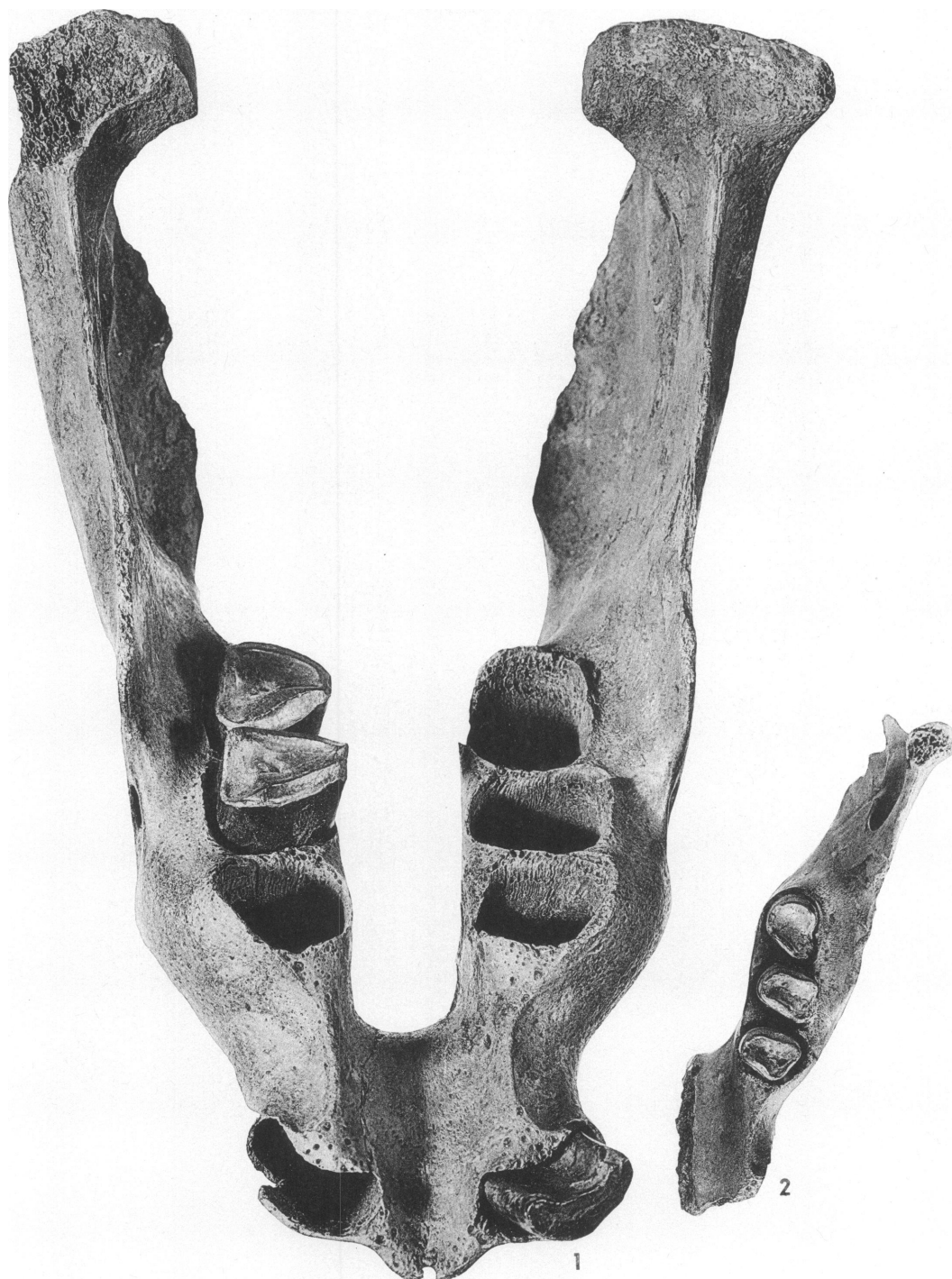
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 16876, anterior view.
Ciego Montero. $\times 4/5$



Megalocnus rodens rodens Leidy, 1868. 1. Type incomplete mandible, right side view (after de Castro, 1865). $\times \frac{1}{2}$. 2. A.M.N.H. No. 16876, right side view. Ciego Montero. $\times \frac{4}{5}$



Megalocnus rodens rodens Leidy, 1868. 1. Type incomplete mandible, top view (after de Castro, 1865). $\times \frac{1}{2}$. 2. Cross section of right M_1 of the type (after de Castro, 1865). $\times \frac{1}{2}$. 3. A.M.N.H. No. 16876. Top view. Ciego Montero. $\times \frac{4}{5}$



1. *Megalocnus rodens casimbae* Matthew (*in schedis*), new subspecies, A.M.N.H. No. 49987, type mandible, front and top views

2. *Megalocnus ursulus* Matthew (*in schedis*), new species, A.M.N.H. No. 49997, almost complete left lower jaw from a young individual with M_{2-4} , top view

Both Casimba, Sierra de Jatibonico. Both $\times 1$



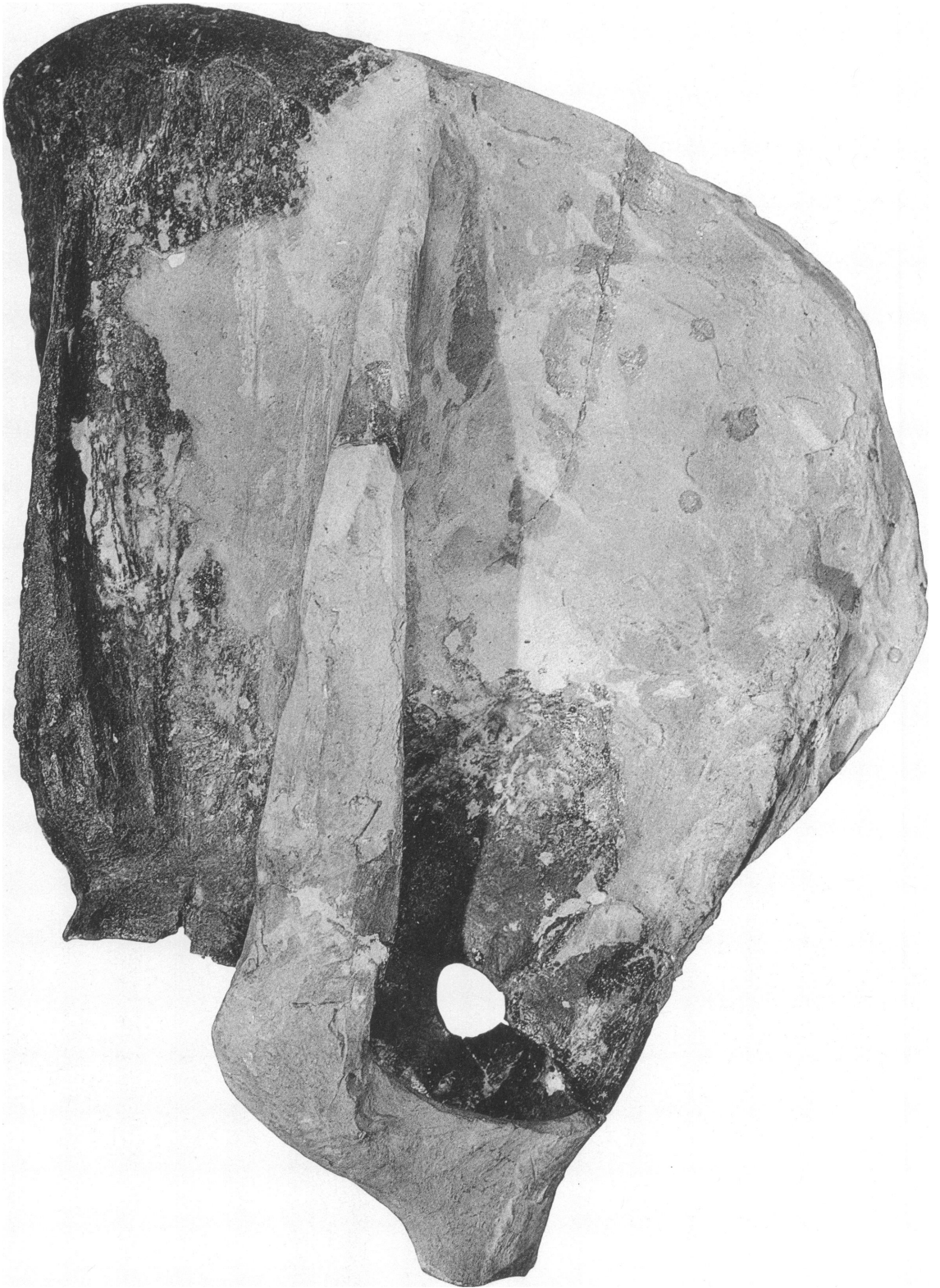
Megalocnus rodens casimbae Matthew (*in schedis*), new subspecies, A.M.-N.H. No. 49987, front view. Casimba, Sierra de Jatibonico. $\times 1$



Megalocnus rodens casimbae Matthew (*in schedis*), new subspecies, A.M.N.H. No. 49987, posterior view. Casimba, Sierra de Jatibonico. $\times 1$



1. *Megalocnus rodens casimbae* Matthew (*in schedis*), new subspecies, A.M.N.H. No. 49987, left side view.
2, 3. *Megalocnus ursulus* Matthew (*in schedis*), new species, A.M.N.H. No. 49997. 2. External side view. 3. Internal side view
All Casimba, Sierra de Jatibonico. All $\times 1$



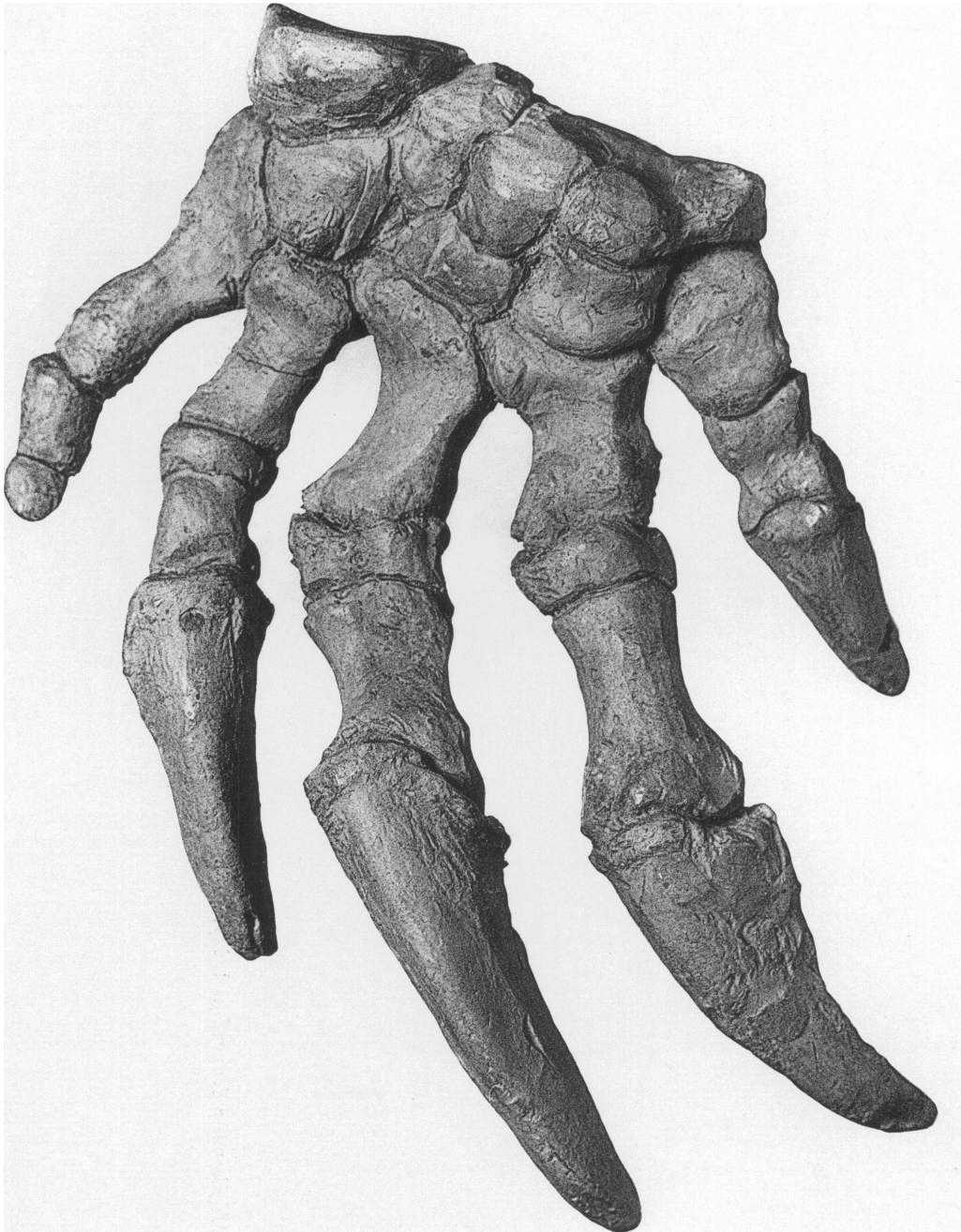
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49968, restored right scapula, external side view.
Ciego Montero. $\times 1$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49969, left humerus. 1. Anterior view. 2. Posterior view. Ciego Montero. $\times 3/5$



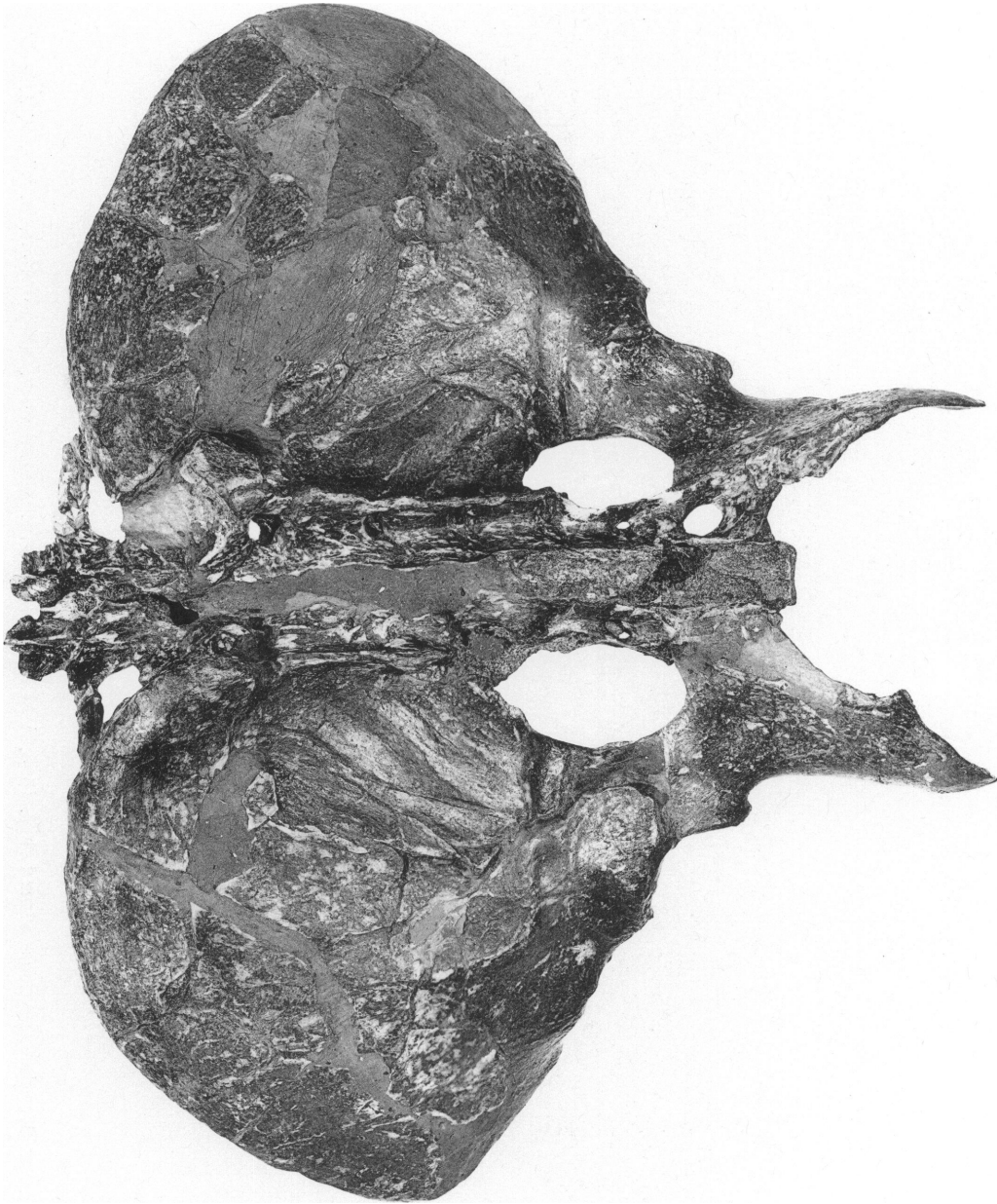
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49973, right radius. 1. Anterior view. 2. Posterior view. Ciego Montero. $\times 4/5$



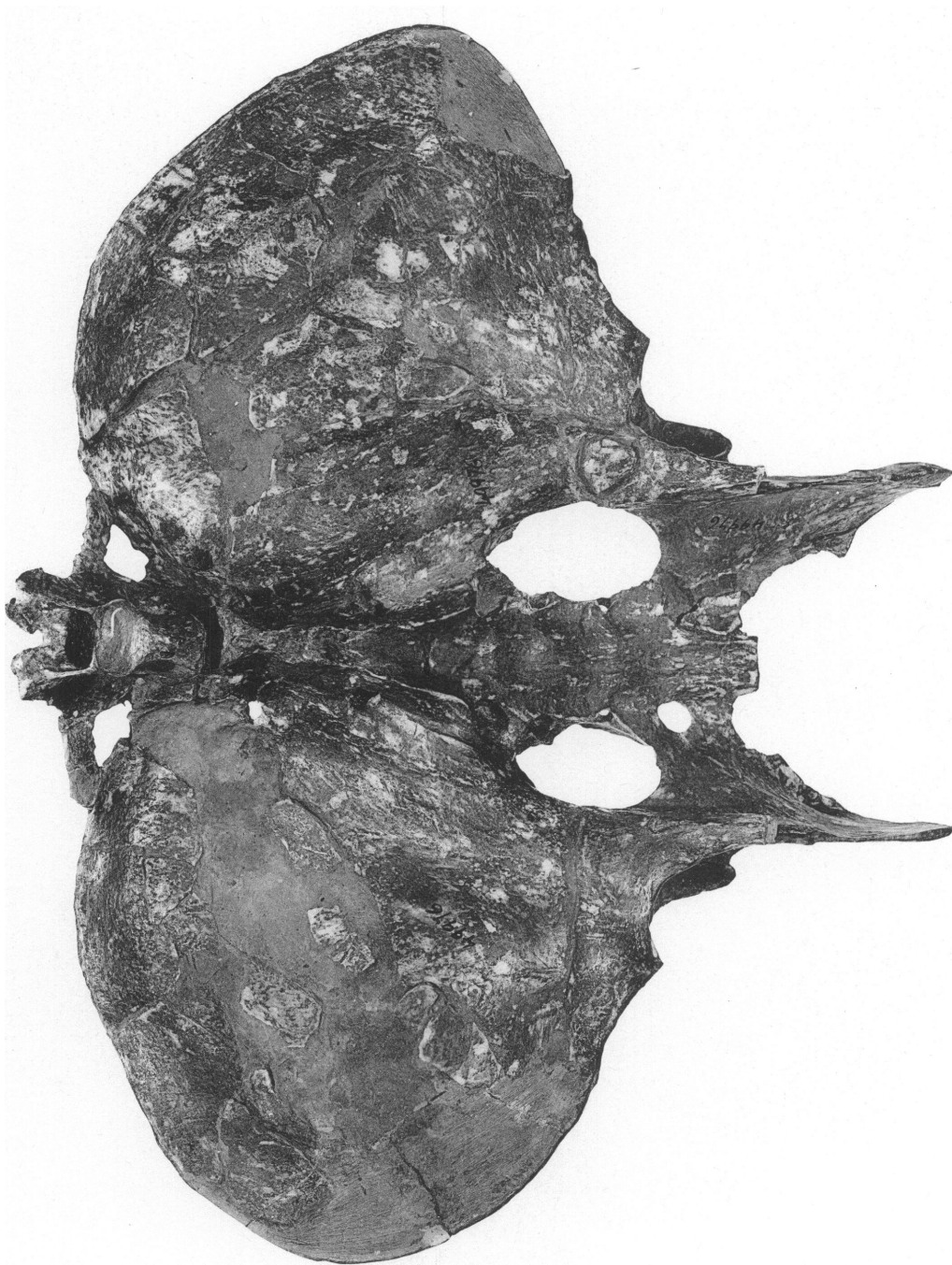
Megalocnus rodens rodens Leidy, 1868, cast from A.M.N.H. No. 16876, mounted composite skeleton, right manus, top view. Ciego Montero. *Ca.* $\times 1$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49976, pelvis, front view. Ciego Montero. Ca. $\times \frac{1}{2}$



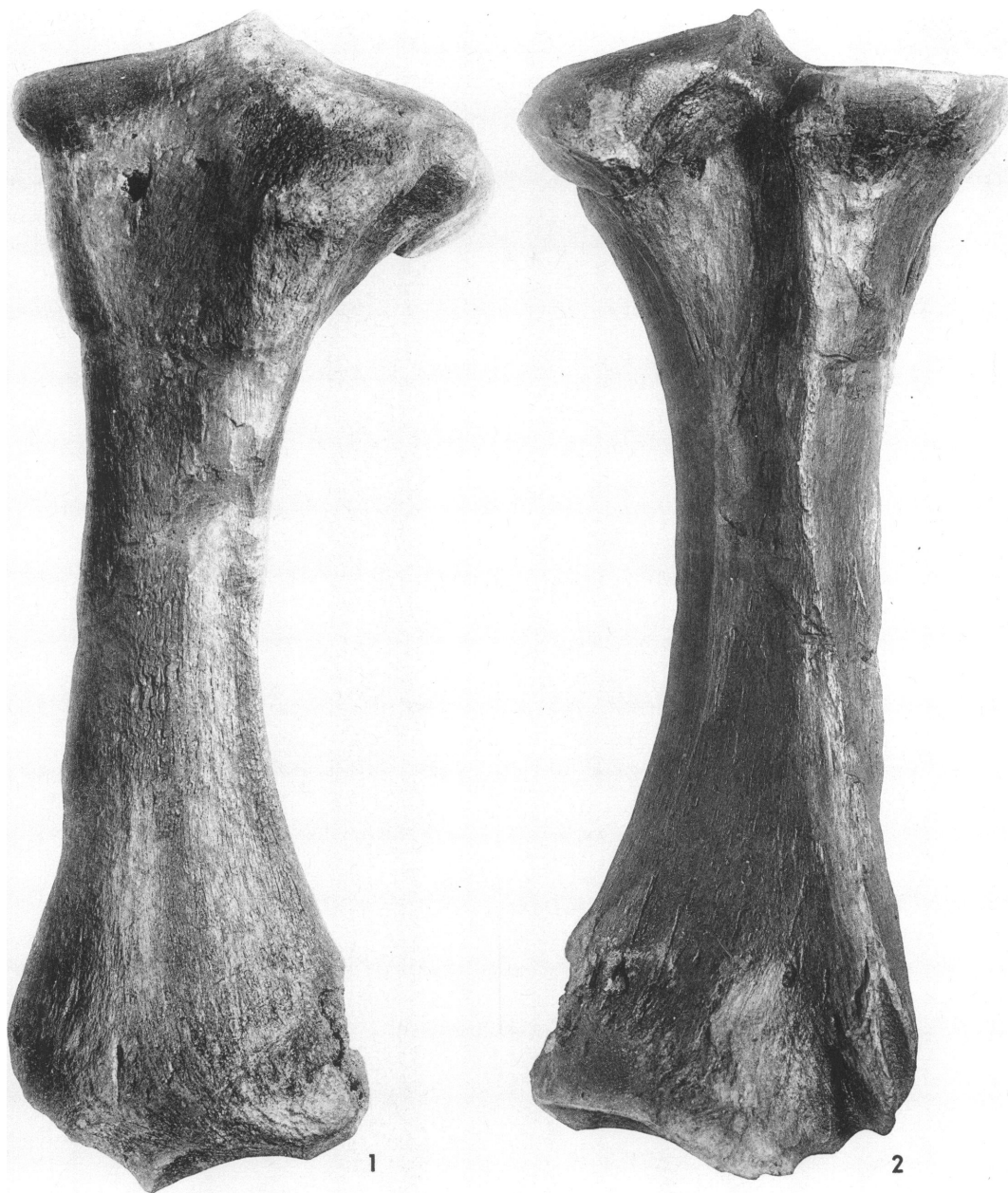
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49976, top view. Ciego Montero. Ca. $\times 2/5$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49976, ventral view. Ciego Montero. Ca. $\times 2/5$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49977, left femur. 1. Anterior view. 2. Posterior view. Ciego Montero. $\times 3/5$



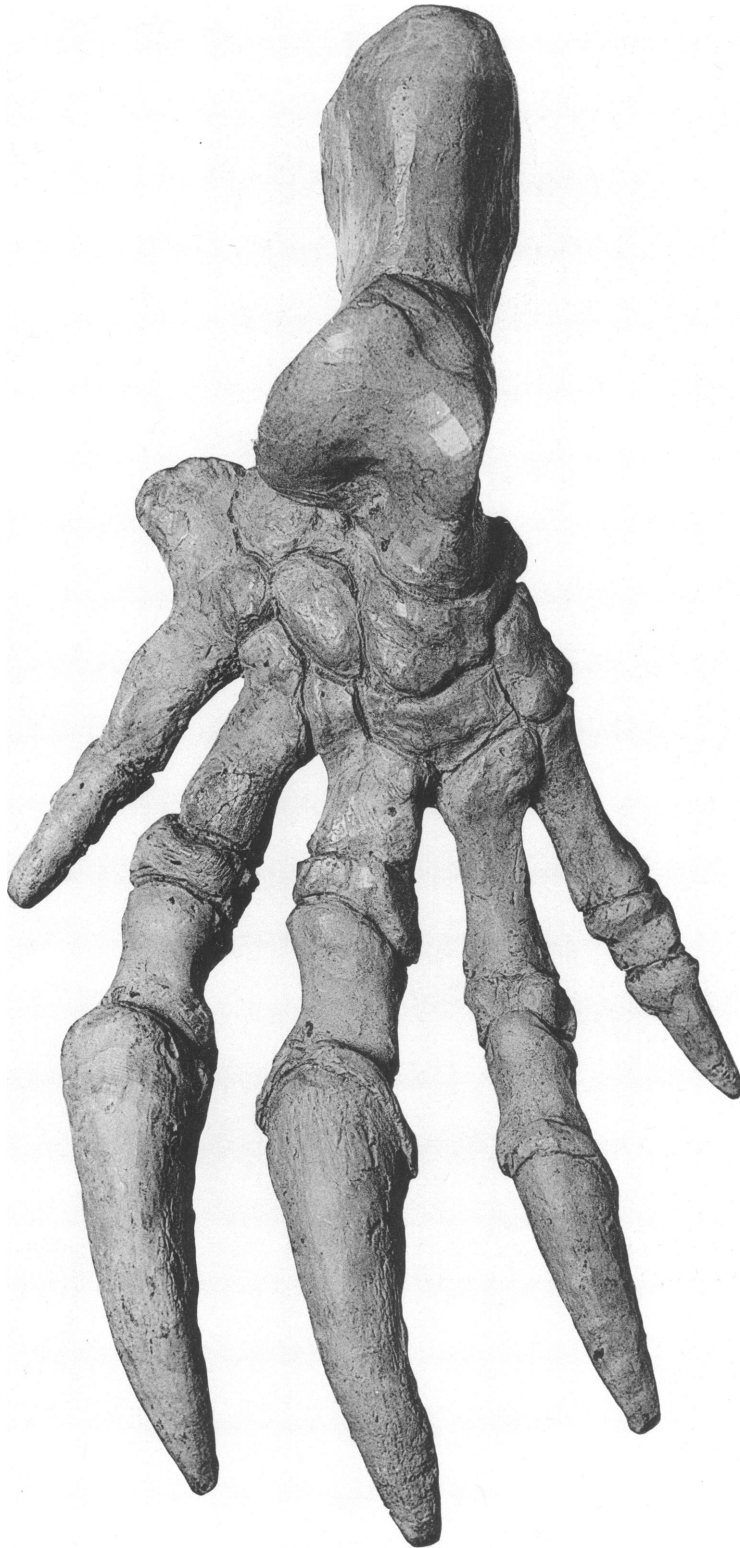
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 49979, right tibia. 1. Anterior view. 2. Posterior view. Ciego Montero. $\times \frac{3}{4}$



Megalocnus rodens rodens Leidy, 1868. 1, 2. A.M.N.H. No. 49985, right calcaneum. 1. Top view. 2. Ventral view. 3, 4. A.M.N.H. No. 49984, right astragalus. 3. Top view. 4. Ventral view. 5, 6. A.M.N.H. No. 49982, left astragalus. 5. Top view. 6. Ventral view. 7, 8. A.M.N.H. No. 49986, navicular. 7. Anterior view. 8. Posterior view. Ciego Montero. All $\times 1$



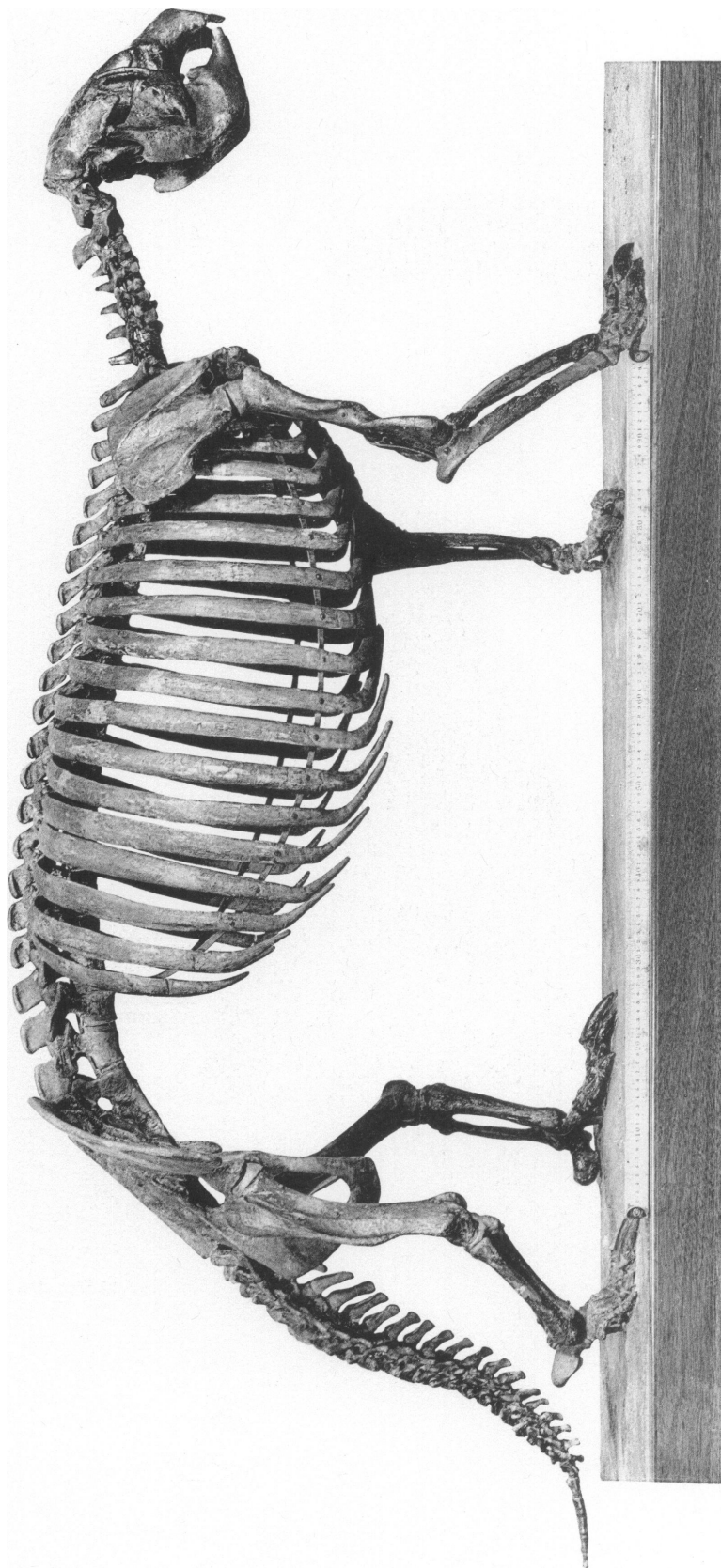
Megalocnus rodens rodens Leidy, 1868. 1, 2. M.N.R.J. No. 2037-V, left calcaneum. 1. Top view. 2. Ventral view. 3-6. A.M.N.H. No. 49899, left metatarsal III. 3. Inner view. 4. Outer view. 5. Dorsal view. 6. Anterior view. Ciego Montero. All $\times 1$



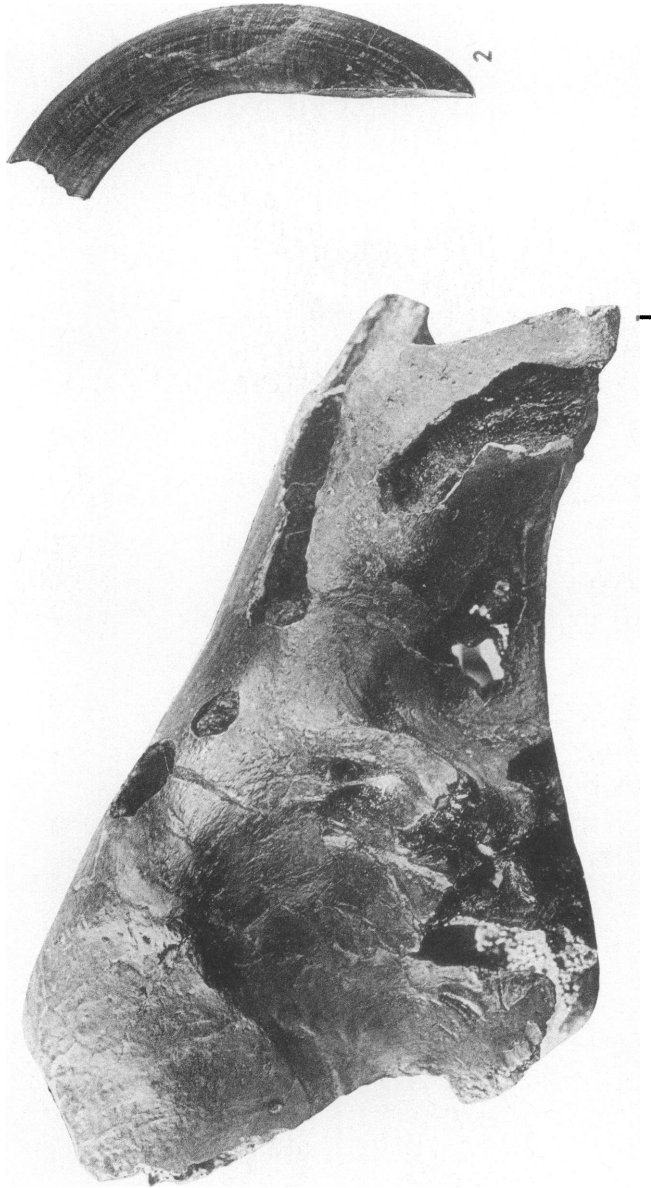
Megalocnus rodens rodens Leidy, 1868, cast from A.M.N.H. No. 16876, mounted composite skeleton, right pes, top view. Ciego Montero. $\times 5/6$



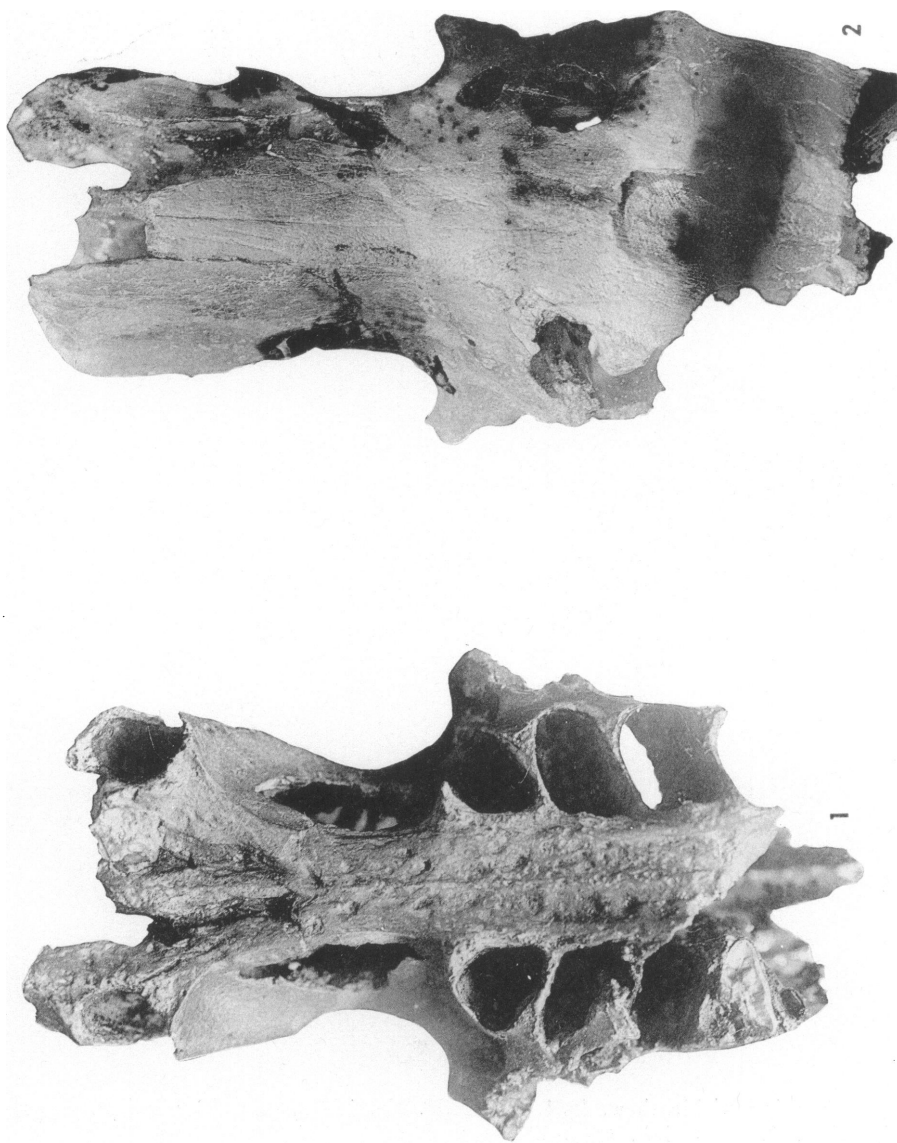
Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 16876, composite skeleton, anterior, angular view. Ciego Montero. *Ca.* $\times 1/7$



Megalocnus rodens rodens Leidy, 1868, A.M.N.H. No. 16876, right side view. Ciego Montero. Ca. $\times 1/9$



1. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16877, anterior half of skull, type, right side view
 2. *Acratocnus antillensis* (Matthew, 1931), A.M.N.H. No. 49934, right upper "caniniform" tooth (M¹), external side view
- Both Ciego Montero. Both $\times 1$



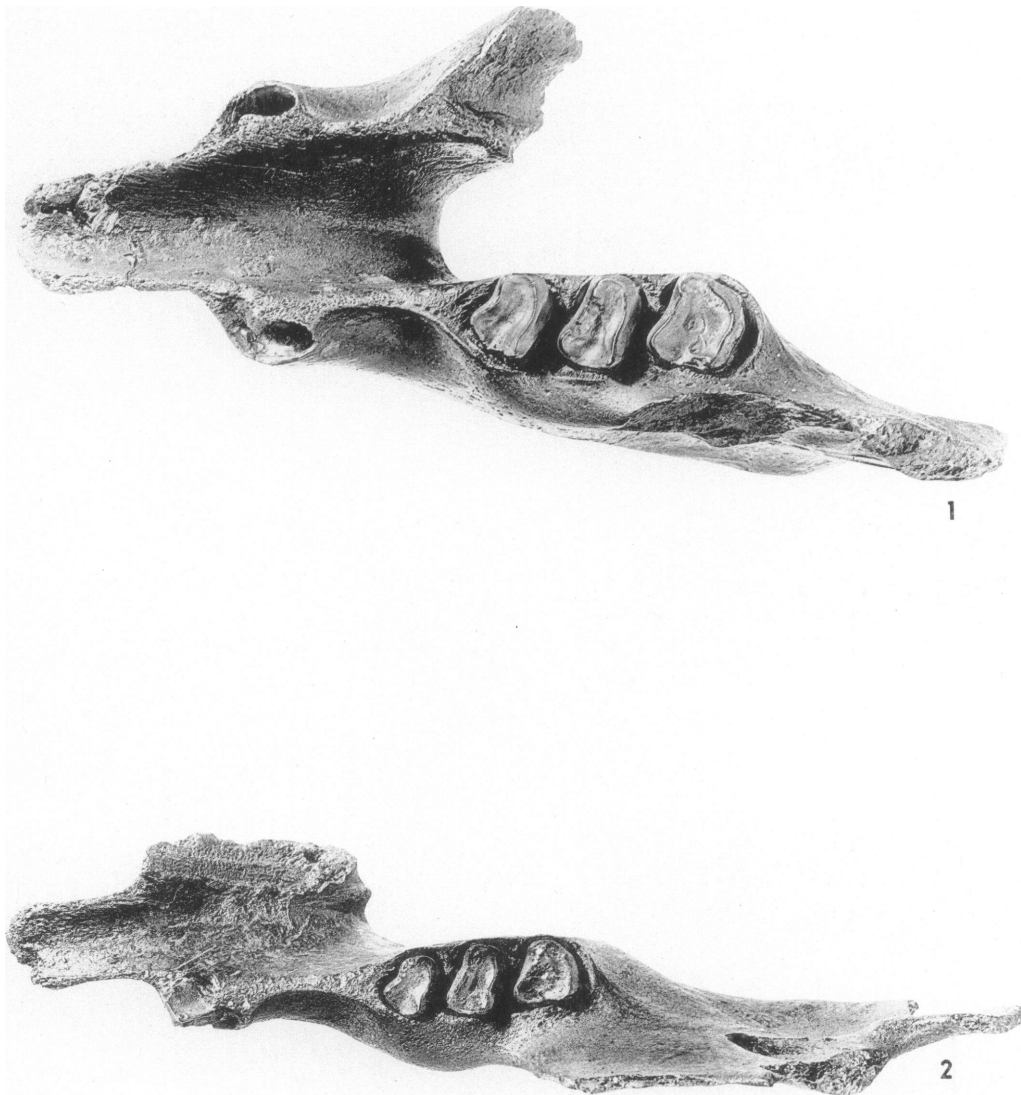
Mesocnus browni Matthew, 1931, A.M.N.H. No. 16877, anterior half of skull, type. 1. Palatal view.
2. Top view. Ciego Montero. X 1



1, 2. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16878, partial lower jaw, paratype.
1. Left side view. 2. Front view. Ciego Montero

3. *Mesocnus torrei* Matthew, 1931, A.M.N.H. No. 16879, incomplete lower jaw, type, left side view. Casimba, Sierra de Jatibonico

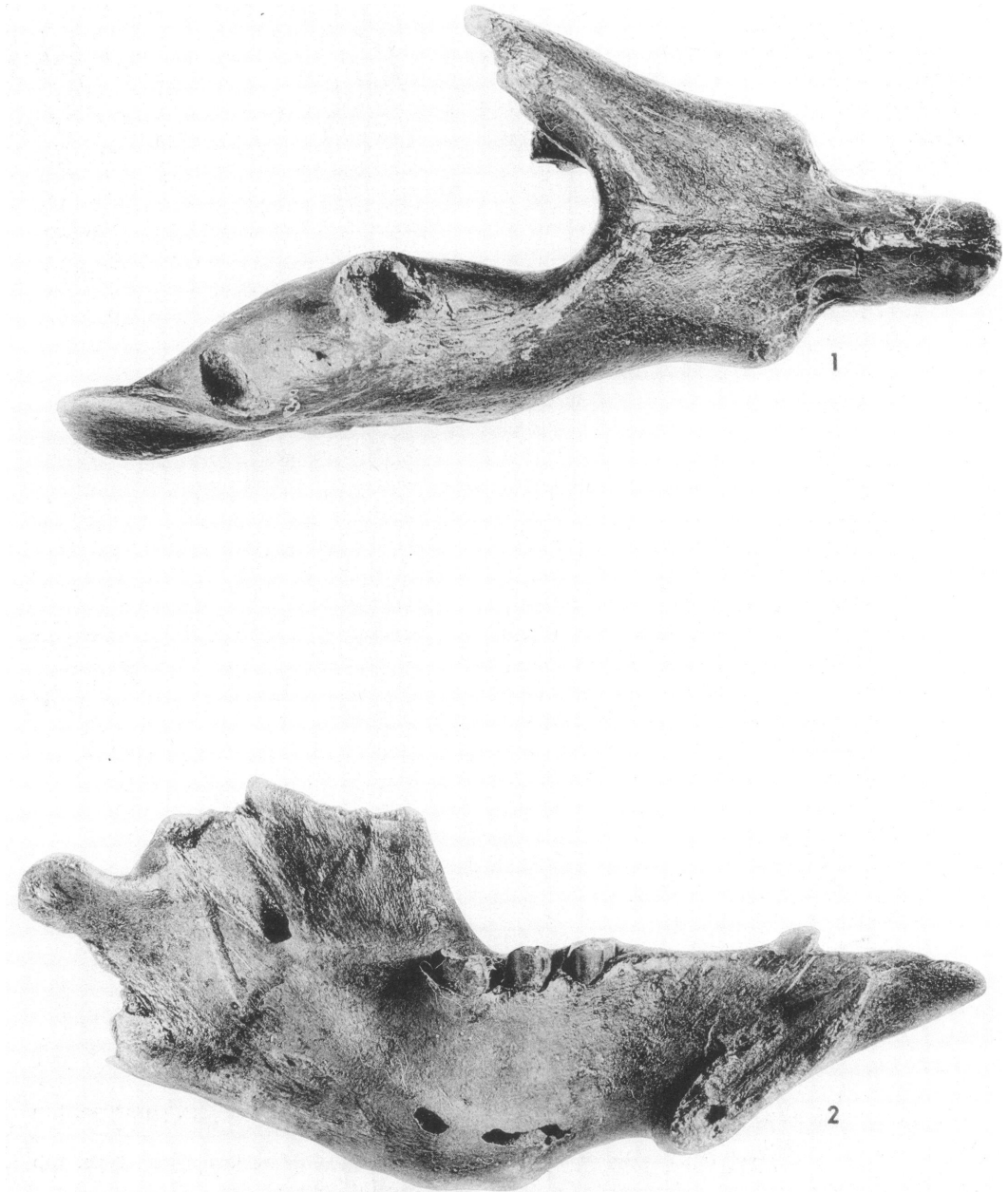
All $\times 1$



1. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16878, partial lower jaw, paratype, top view. Ciego Montero

2. *Mesocnus torrei* Matthew, 1931, A.M.N.H. No. 16879, incomplete lower jaw, type, top view (the third tooth, M_3 , is lacking). Casimba, Sierra de Jatibonico

Both $\times 1$



1. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16878, partial lower jaw, paratype, ventral view. Ciego Montero

2. *Mesocnus torrei* Matthew, 1931, A.M.N.H. No. 16879, incomplete lower jaw, type, internal side view of the left ramus (M_3 is lacking). Casimba, Sierra de Jatibonico

Both $\times 1$



Mesocnus browni Matthew, 1931, right humeri, anterior view. 1. M.P.U.H. No. 1652. 2. A.M.N.H. No. 49918. Ciego Montero. Both $\times 1$



Mesocnus browni Matthew, 1931, right humeri, posterior view. 1. M.P.U.H. No. 1652. 2. A.M.N.H. No. 49918. Ciego Montero. $\times 1$



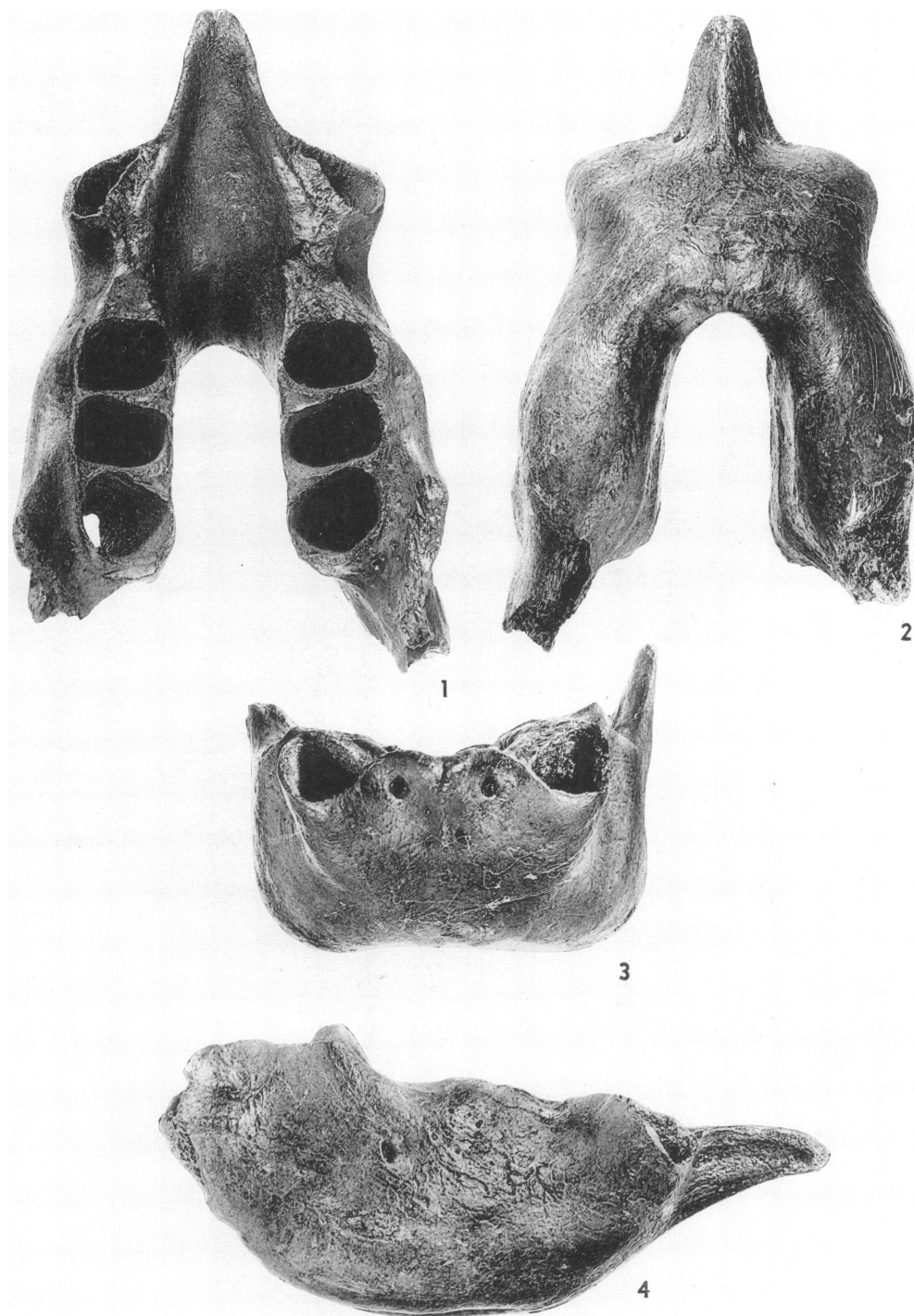
Mesocnus browni Matthew, 1931. 1. A.M.N.H. No. 49919, proximal end of left femur, front view. 2. A.M.N.H. No. 49925, left fibula, internal side view. 3. A.M.N.H. No. 49921, right tibia, posterior view. Ciego Montero. All ca. $\times 5/6$



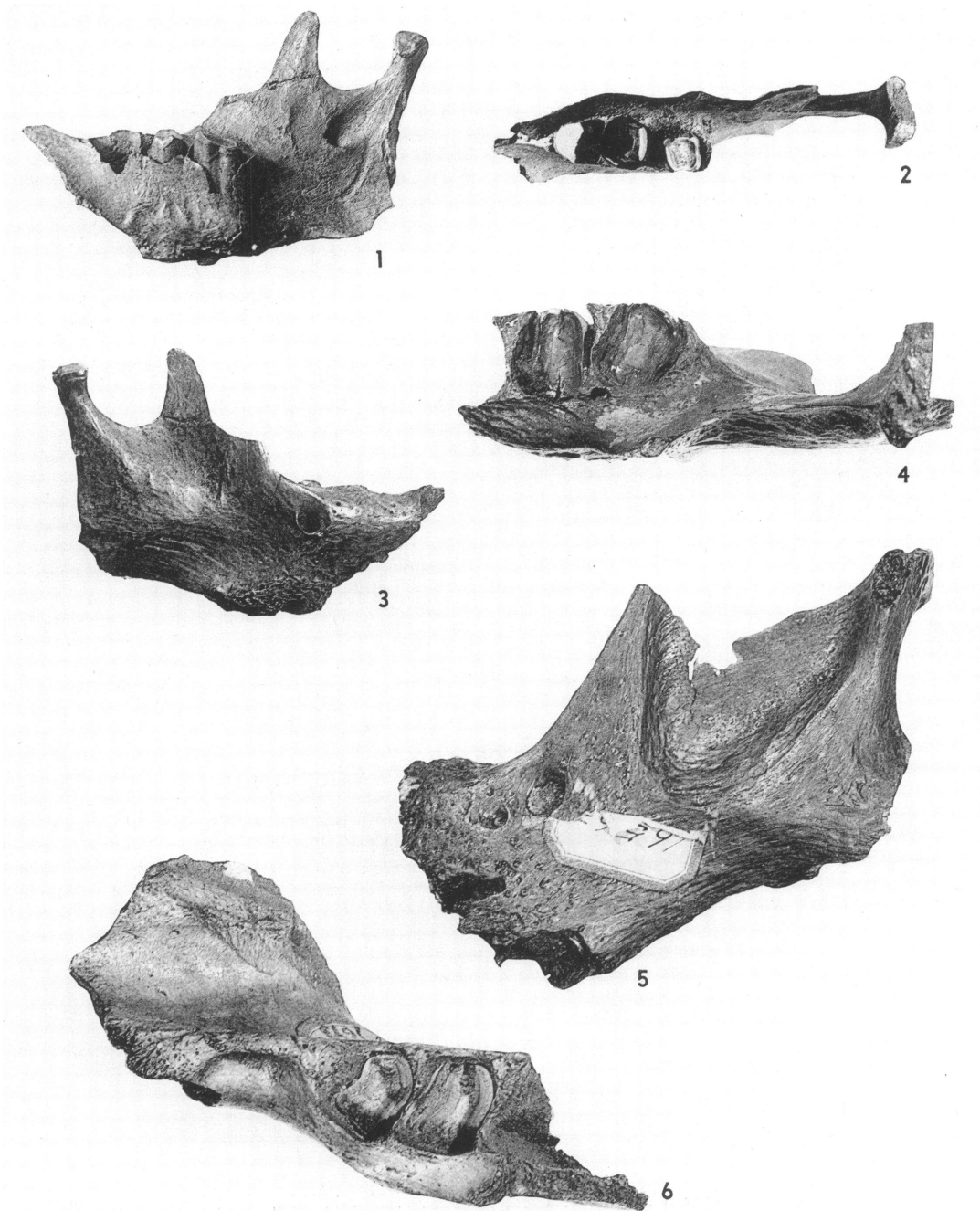
Mesocnus browni Matthew, 1931. 1. A.M.N.H. No. 49919, proximal end of left femur, posterior view.
2. A.M.N.H. No. 49925, left fibula, external side view. 3. A.M.N.H. No. 49921, right tibia, anterior view.
Ciego Montero. All *ca.* $\times 5/6$



Mesocnus torrei Matthew, 1931, A.M.N.H. No. 49927, right humerus. 1. Posterior view. 2. Front view. Casimba, Sierra de Jatibonico. *Ca.* $\times 1$



Acratocnus antillensis (Matthew, 1931), A.M.N.H. No. 16880, incomplete mandible, type.
1. Top view. 2. Ventral view. 3. Front view. 4. Right side view. Casimba, Sierra de
Jatibonico. $\times 1$



1-3. *Microcnus gliriformis* Matthew, 1931, A.M.N.H. No. 16882, incomplete right lower jaw (coronoid process lacking), type. 1. Internal side view. 2. Top view. 3. External side view

4-6. *Acratocnus antillensis* (Matthew, 1931). 4, 5. A.M.N.H. No. 16881, fragment of left lower jaw, paratype. 4. Top view. 5. External side view. 6. M.P.U.H. No. 1673, anterior fragment of mandible with left M_{2-3} preserved, top view

All Casimba, Sierra de Jatibonico. All ca. $\times 1$



1. *Akratocnus odontrigonus* Anthony, 1916, A.M.N.H. No. 17361a, right humerus, front view. Utuado, Puerto Rico

2. *Akratocnus antillensis* (Matthew, 1931), A.M.N.H. No. 49940, right humerus, front view. Casimba, Sierra de Jatibonico, Cuba

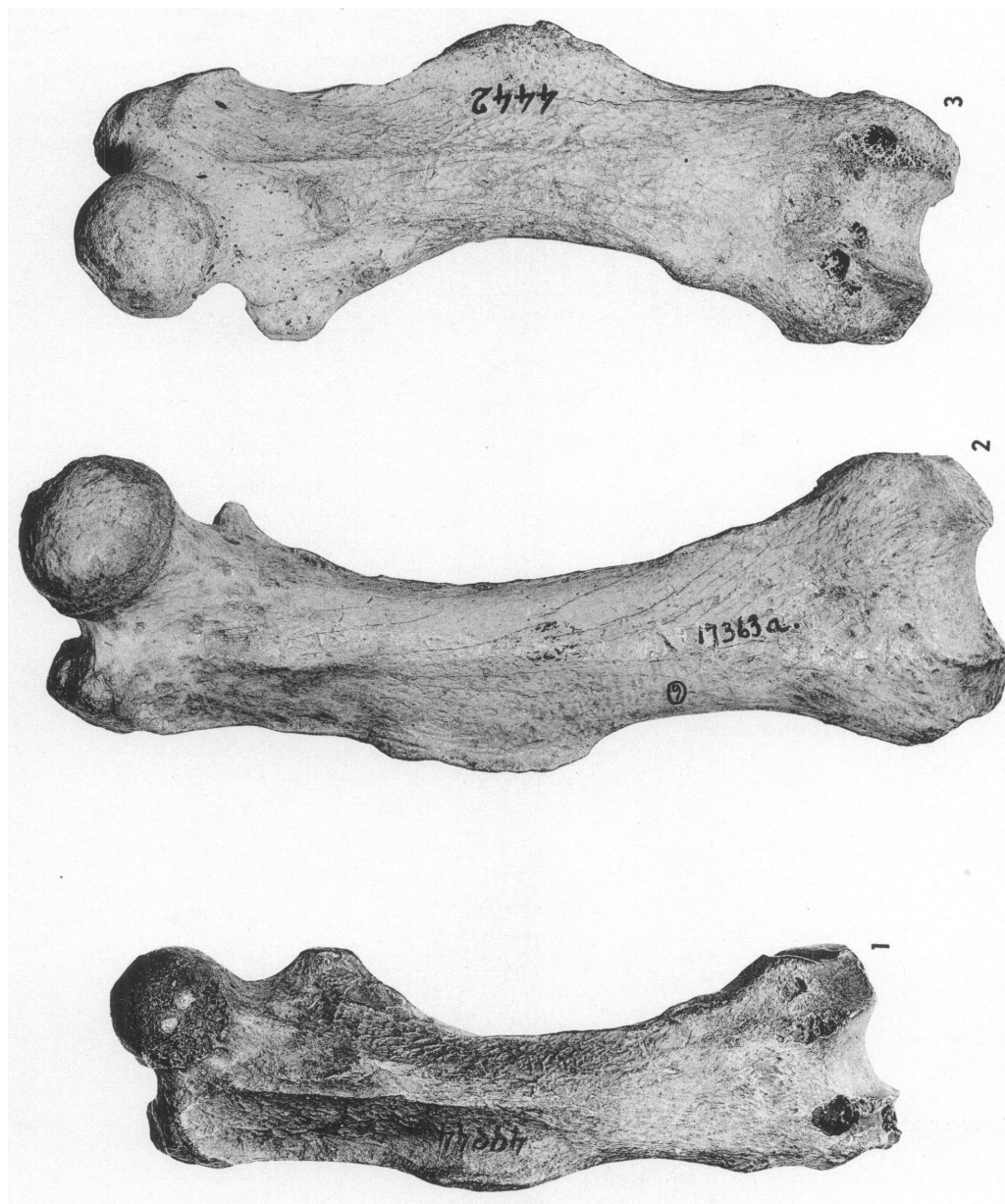
Both $\times 1$



1. *Acratocnus odontrionus* Anthony, 1916, A.M.N.H. No. 17361a, right humerus, posterior view. Utuado, Puerto Rico

2. *Acratocnus antillensis* (Matthew, 1931), A.M.N.H. No. 49940, right humerus, posterior view. Casimba, Sierra de Jatibonico, Cuba

Both $\times 1$



1. *Acratocnus antillensis* (Matthew, 1931), A.M.N.H. No. 49944, right femur, front view. Casimba, Sierra de Jatibonico, Cuba
2. *Acratocnus odontrigonus* Anthony, 1916, A.M.N.H. No. 17363a, right femur, front view. Morovis, Puerto Rico
3. *Acratocnus antillensis* (Matthew, 1931) (?), M.C.Z. No. 4442, left femur, front view. Sierra de Jatibonico, Cuba

All $\times 5/6$



1. *Acratocnus antillensis* (Matthew, 1931), A.M.N.H. No. 49944, right femur, posterior view. Casimba, Sierra de Jatibonico, Cuba
 2. *Acratocnus odontrigonus* Anthony, 1916, A.M.N.H. No. 17363a, right femur, posterior view. Morovis, Puerto Rico
 3. *Acratocnus antillensis* (Matthew, 1931) (?), M.C.Z. No. 4442, left femur, posterior view. Sierra de Jatibonico, Cuba
- All $\times 5/6$

