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A NEW FOSSIL RODENT FROM PUERTO RICO

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Before 1916 the known mammalian fauna of Puerto Rico consisted entirely of a few bats. Thanks to the initial investigations of the anthropologists, the resulting description of *Isolobodon* by J. A. Allen, and the subsequent intensive work of H. E. Anthony, the living fauna is known to be the very impoverished relict of a much richer but still unbalanced and peculiar pre-Columbian and Pleistocene assemblage.

This known fauna is all of relatively recent age, much of it probably very recently extinct, and the ancestors and older representatives of these forms are still wholly unrecorded. Even among the sub-Recent fauna it may be suspected that there are still additions to be made.

The contribution of any detail to the present inadequate history and paleontology of this region is in consequence thoroughly worth while. For this reason we are placing on record a new rodent from this island, although we are compelled to found it upon a single fragmentary mandible, and the precise locality of the find is no longer ascertainable.

The fossil here described was collected by James Thorp in 1930. The label with the small collection which contains it reads, in the handwriting of the late N. L. Britton (of the New York Botanical Garden and the Scientific Survey of Porto Rico): "From a crevice in Corozal Limestone Quarry—James Thorp, N. L. Britton. January 19, 1931."

The island of collection is, it will be noted, omitted from the label. Dr. Thorp (now at the University of Nebraska) has, however (in letter), confirmed the general locality of the find, Corozal in north central Puerto Rico, although he no longer has his original notes on the exact provenance or circumstances of the collection.

All the material of the collection including the mandible of the new rodent is mineralized to a notable extent. The bones are dark gray and heavy, quite unlike the yellow, unmineralized fossils previously collected in Puerto Rico (collections of both the American Museum of Natural History and the Museum of Comparative Zoölogy were examined).

The Corozal collection includes, in addition to the rodent mandible, fragments of the shell of a turtle, a complete lizard femur, the proximal end of another lizard femur, a very imperfect tibia, the shaft of one long bone, and the head of another.

The turtle fragments (all plastral) cannot be identified generically but are consistent with the plausible supposition that they appertain to a species of *Pseudemys*, the living genus of the island.

The complete lizard femur is of such size as to invite comparison with *Cyclura*, *Ctenosaura*, or *Iguana*. It has been compared with paratypes and other material of *Cyclura portoricensis* Barbour, with *Cyclura macleayi* and *C. cornuta*, with the proximal end of a femur of a fossil *Cyclura* from Mona Island between Hispaniola and Puerto Rico, and with a femur of a fossil *Cyclura* from Exuma Island in the Bahamas (the same collection as that cited by G. M. Allen, 1937). The Corozal fossil differs from the compared bones in several respects in which all the compared materials agree. The shaft of the Corozal femur is straighter and stouter; the head is somewhat differently placed; in details there appear to be quite a number of significant differences. The Corozal bone is also slightly larger than any of the compared material. The same and additional differences appear on comparison with *Iguana*, *Ctenosaura*, and *Conolophus*. Indeed, comparison of the fossil with a considerable variety of lizard femora makes it evident that the generic and even the family assignment of this bone requires further study.

The other bone fragments are too poorly preserved for identification.

The new rodent is represented by a single left mandible lacking the angle and most of the coronoid as well as much of the incisor region (fig. 1). The three molars are present; the premolar is absent. The dental pattern is highly distinctive, quite unlike that of any hitherto known West Indian form, but apparently indistinguishable from that of the subgenus *Trinomys* of the continental genus *Proechimys*. The form represented must, how-

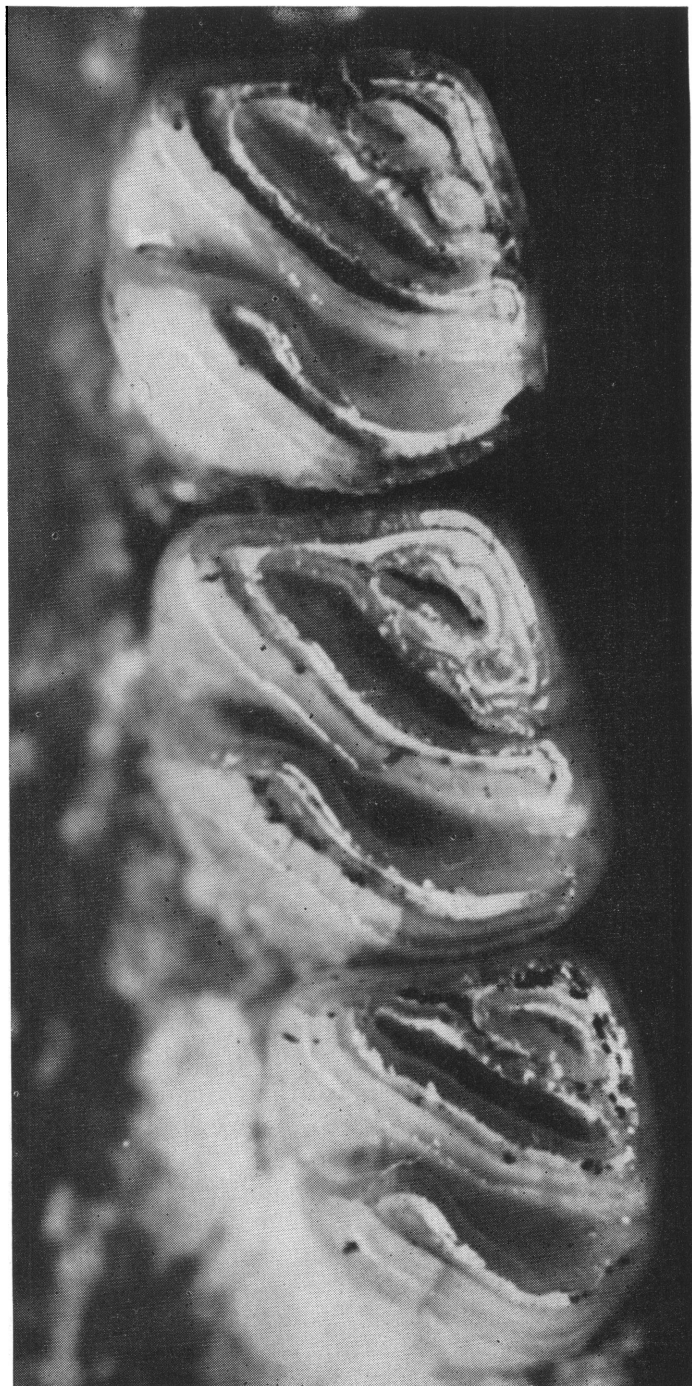


FIG. 1. *Prochinnys corozalus*, new species. Type, A.M.N.H. No. 17640, crown view of mandibular teeth. About 17 times natural size.

ever, have been very much larger than any living member of that genus and differs in other respects. It can be described as:

***Proechimys corozalus*, new species**

TYPE: A left mandible, A.M.N.H. No. 17640.

TYPE LOCALITY: Corozal, Puerto Rico.

HORIZON: Unknown.

DIAGNOSIS: Closest in dental pattern to *Proechimys* (*Trinomys*) *iheringi*, but differing in having the masseteric ridge on the mandible considerably less well developed, the second lower molar larger than the first and third, and in being much larger in size.

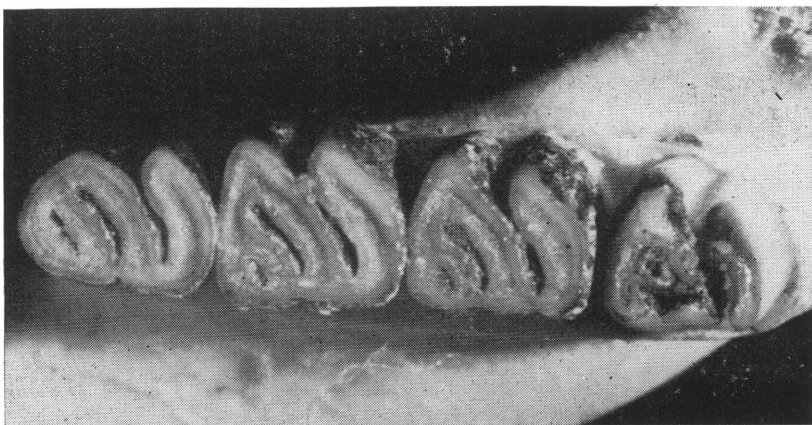


FIG. 2. *Proechimys* (*Trinomys*) *iheringi*. Topotype, M.C.Z. No. 25768, crown view of mandibular teeth, right side. About 11 times natural size.

Estimated length of the mandibular tooth row, 14.1 mm.; same length in *P. iheringi*, 9.2 mm.

Dr. Albert Wood, who has examined this form and compared it with a topotype of *P. iheringi* (fig. 2), has generously consented to the quotation of his remarks:

"... I would have no hesitation in including your fossil in *Proechimys*. As you say, there are differences in wear. But I think that takes care of nearly all differences in pattern. The small anterolateral valley in your fossil is shallower than in the Recent specimen in a less worn tooth which suggests either a more advanced stage (progress toward elimination of the valleys) or a more primitive stage (crown height increased but valley depth

not). Not knowing which way these beasts are evolving, I couldn't say which it is. Your fossil apparently shows slightly greater angulation to the crests, suggesting remnants of the original cusps, and hence being a more primitive condition. It would appear also that the posterior valley may be closed buccally as well as lingually, which would be a primitive arrangement.

"In short, I would consider this a *Proechimys*, but more primitive than *P. iheringi*. . . ."

DISCUSSION

The subgenus *Trinomys* of the genus *Proechimys* is at present restricted to southeastern Brazil and is in fact separated from typical *Proechimys* by an arid belt, believed not to be inhabited by the genus, extending from Ceará on the northeast coast of Brazil south and southwest to latitude 20° S. (Moojen, 1948). This subgenus is thus at present widely separated from any area contiguous to either the Lesser or the Greater Antilles, although the remainder of the genus does now occupy the pertinent areas of South and Central America. If the new Puerto Rican rodent is consubgeneric with *Trinomys* the present distribution may be a relict one.

Two questions must, however, be answered before such a hypothesis can be verified:

1. Is the Puerto Rican form unquestionably a *Trinomys*?
2. What is the age of the Puerto Rican fossil?

In regard to the first question, *Proechimys corozalus* is known only from a partial mandible. The dental pattern is peculiar enough to establish its general relationships with certainty; as has been stated above, its lower molar pattern cannot be distinguished from that of *Trinomys*. But in the absence of the lower premolar and of the angle and the coronoid of the lower jaw and in view of our ignorance of every other part of the skeleton, it is rash to say categorically that when the animal is known more completely no characters will be found to distinguish this form at a higher taxonomic level than that of species. Identification with *Trinomys* is reasonable on present evidence but the identity is not demonstrated, and, indeed, it must be pointed out that one of the canons set up by Moojen for the discrimination of *Trinomys*, that of decreasing size of the successive molar teeth posteriorly, is violated by the fossil. Further, so far as known, *Trinomys* al-

ways has the outer mandibular ridge better developed than is the case in the fossil.

As regards the second question, the age of the fossil is equally problematical. We know nothing of its age from any evidence except that of the specimen itself and the immediately associated reptilian material. Inference in this matter is based on the degree of mineralization and the degree of morphological difference.

The bone has not been replaced in the fossils under question; it has merely been infiltrated with minerals. Furthermore the degree of mineralization is not equivalent in all the specimens. The turtle fragments in particular are little mineralized; the complete lizard femur is markedly so; the other bones are in an intermediate stage. In any event, since mineralization is not a simple function of time, no valid judgment can be made on this point, nor can the contemporaneity of the several fragments be maintained or denied on this evidence. Mineralization indicates the possibility of considerable age, no more.

With regard to the new rodent, the argument from degree of morphological difference is ambiguous. That it seems to be referable to a modern genus argues that it is possibly of Recent or near Recent age. Its size, however, which is anomalous in the genus, its failure to fit precisely into either *Trinomys* or *Proechimys* as defined by Moojen (1948), that is, combination of *Trinomys* crown pattern with *Proechimys* molar proportions, and other dental features that are apparently primitive (cf. Wood, quoted above) point possibly to greater age. At all events these distinctive characters raise some difficulty for the otherwise plausible hypothesis that the form is truly Recent, or an importation by man.

Moojen's hypothesis that *Trinomys* is the differentiated, *Proechimys* the primitive, form within the genus would count, if correct, against the age of the specimen (and possibly in favor of human transport), but his grounds for this suggestion do not seem adequate. There is no critical fossil evidence at present. The only known fossil *Proechimys*, *sensu lato*, is a *Trinomys* within the present range of that subgenus; it therefore neither favors nor denies a possible ancient greater extension of the range of *Trinomys*. The characters that Moojen cites as probably specialized are differences indeed from typical *Proechimys*, but they by no means contain within themselves indication of the direction of change. Finally in support of the alternative hypothesis of the

relict nature of present-day *Trinomys*, Dr. P. E. Vanzolini permits us to cite his still unpublished conclusion that the subspecies of *Amphisbaena fuliginosa* in Bahia (within, therefore, the isolated southeast Brazilian zone that contains *Trinomys* today) is a relict of the primitive form within that species. Dr. Vanzolini believes that this is a pattern of evolution rather frequent in Brazil, that forms of the humid eastern coast of Brazil, separated by the arid zone, have not in general differentiated as much as those in the rest of the range.

Another fact that may be of importance is the suitability in a morphological sense, as G. S. Miller pointed out in 1916 and again in 1930, of *Proechimys* as the ancestor of the *Homopsomys-Heteropsomys-Brotomys-Boromys* group of West Indian rodents. The modifications necessary for these forms to be derived from a *Proechimys*-like ancestor are closely equivalent to those that on the continent have apparently given rise to *Cercomys* from a *Proechimys* ancestor. If this morphological suitability really indicates phyletic derivation, then the Puerto Rican *Proechimys* may be significantly older than the specialized endemic West Indian genera. But this is only a possibility. Morphological differentiation is not a simple function of time, and a structural ancestor may exist contemporaneously with a specialized derivative of the same stock. If there be any relationship between *Proechimys* and the West Indian genera, this contemporaneity of primitive and specialized types has certainly been true as between the continent and the islands, if not on the islands themselves.

These evidences, then, whether of degree of mineralization or of morphological difference, are inconclusive singly. Taken together, however, they are more indicative, and, considered against the background of the very extensive sub-Recent collections of Anthony and others, they begin to be impressive. Nothing at all similar to either the rodent mandible or the lizard femur occurs in the great mass of material from sub-Recent caves. The absence of one of the Coroza fossils might be an accident of collecting; the absence of both from cave and midden deposits and their association at Coroza increase the probability that we deal with two faunas not identical in age. If, then, the Coroza fossils are not contemporaneous with the sub-Recent fossils, they may be younger or older—truly Recent or Pleistocene or more ancient still. That the Coroza forms are recent seems unlikely. The sub-Recent deposits extend upward into at least pre-Columbian

times. To be more recent than anything in these deposits, the new rodent presumably must be a post-Columbian importation by man from South or Central America. No such form, however, is known from South or Central America. The size, as we have before insisted, is anomalous in the modern genus. Even if we assume that the absence of *Proechimys corozalus* in collections of South American mammals is owing to our imperfect knowledge of the continental fauna, the presence of the associated lizard on Puerto Rico is equally difficult to explain. It resembles no compared form of the continent or of the islands.

Against this background let us consider again the matter of mineralization. This, as we have remarked, is consistent with considerable, probably Pleistocene, age. On the whole, although it cannot be demonstrated, it can be considered probable that the Corozal fossils are older than any terrestrial vertebrates previously collected in Puerto Rico.

If this antiquity of the Corozal material is correctly inferred, the importance of the find is very great. But argument cannot dispel our uncertainties. A renewed investigation of Puerto Rico and of the other West Indies is very evidently called for. In the interim the authors provisionally adopt the following hypothesis:

Proechimys in a *Trinomys*-like stage, probably much resembling our Puerto Rican fossil, formerly occupied a continuous forest in north and central South America. A representative of this early *Proechimys* stock reached, by means and paths not yet clear, the West Indies and specifically Puerto Rico. In the West Indies this stock underwent rather rapid differentiation in the several islands, giving rise to endemic forms in Cuba, Hispaniola, and Puerto Rico, early becoming extinct in Jamaica, if it ever reached that island. The same stock on the continent became separated during the Pleistocene into two zones by the development of an arid intermediate area unfavorable for the genus. The animals of the Amazonian and Guianan zone differentiated further (into typical *Proechimys*) and spread northward into Central America, while the stock isolated on the southeast coast of Brazil retained primitive characters.

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