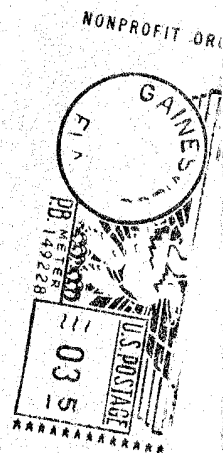


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COLLECTING FOSSIL MAMMALS IN THE GREATER ANTILLES:
AN IMMENSE JOURNEY

Charles A. Woods

Florida State Museum

A Publication of the

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Official News

THE FIFTH ANNUAL PALEONTOLOGICAL MEETING

The Fifth Annual Paleontological Meeting will be held in the J. Wayne Reitz Student Union Auditorium at the University of Florida on Saturday, 11 October. The morning session will begin at 8 a.m. and consist of talks on Florida paleontology and stratigraphy. These talks will serve as an introduction to the afternoon's activity. After a break for lunch, at 1:30 p.m. we will assemble for an afternoon field trip to several important localities in the Gainesville region. Because of planning it is necessary for the organizing committee to have a firm idea about the number of persons who will attend this field trip. The cost is \$7.50, which covers the expenses of rental buses, refreshments, and guide pamphlets. Please complete the enclosed pre-registration form and return it as soon as possible.

NOMINATIONS OF NEW OFFICERS

The nominations committee submits the following nominations for the elections at the Fifth Annual Meeting to be held on 11 October:

President-Elect: Bruce J. MacFadden
Vice-President: Steve Hartman
Secretary-Treasurer: Howard Converse

Other nominations may be submitted in writing to the Secretary-Treasurer of the FPS no later than 1 September. Ballots will be mailed to members on 2 September. In order to be counted, these must be returned by 30 September. As stated in Article III, Section 5 of the FPS By-Laws, nominations may not be made from the floor at the Annual Meeting (S. David Webb, Chairman, Nominating Committee).

FPS 1981 FIELD CAMP

At the 4th Annual Meeting last October 2 a suggestion was made that the FPS, in cooperation with the Florida State Museum, provide field services to the Museum for coordinated digs at sites important to Florida paleontology, but which, for various reasons, have not been worked adequately. This suggestion received favorable consideration at the Board of Directors' meeting this March; and a decision was reached to explore the feasibility of such a program. A 1981 Field Camp Committee was appointed by President Webb, with Ed Brown serving as Chairman.

An initial two-week dig has tentatively been scheduled at the Thomas Farm site in late Spring or early Summer 1981. The Committee envisions the principal purposes of this program to be:

1. To accelerate the collection and preservation of important Florida fossils for science as represented by the Florida State Museum;
2. To instruct the participating membership in the techniques of professional collection, preservation and identification of fossils through field work supervised and coordinated by the professional staff of the Museum; and
3. To generate an environment that will encourage a free flow of communication and information between the amateur paleontologist and his institutionalized counterpart.

The Committee anticipates that every participant will pay for their share of expenses. Museum personnel will provide supervision, coordination, and instruction at the site. The site selected is somewhat isolated (the towns of Bell and Branford are the nearest communities). Primitive living conditions may be expected (possibly sleeping bags, tents, outdoor johns, limited washing facilities, no t.v., etc.). A relatively regimented

regime is envisioned (regular work periods during the day, lecture and/or discussion sessions in the evening, and periodic group trips for recreation and education).

The reaction of the members who might be interested in such a program would help the Committee decide whether or not to develop the program, and, if affirmative, how to structure it to be of optimum benefit to all. To this end for those who might be interested in such a program fill in the enclosed questionnaire and return it to the Secretary-Treasurer (Ed Brown, Chairman, 1981 Field Camp Committee).

FPS COMMITTEE APPOINTMENTS; 1979-1980

Editor; MacFadden
 Historian; Burgess
 Fall Meeting; Converse (Chairman), MacFadden, Waller, Webb
 Spring Meeting; Robertson (Chairman), Jeremiah, Selander
 1981 Field Camp; Brown (Chairman), Converse, Webb,
 MacFadden
 Code of Paleontological Field Work; Waller (Chairman),
 Garcia, Alexon
 By-Laws Committee; Robinson (Chairman), Jeremiah
 SVP Poster Session; Hartman
 Nominations; Webb

REPRINTING OF PAST ISSUES OF *THE PLASTER JACKET*

For those of you who have requested complete sets of *The Plaster Jacket*, please be patient. We have not yet been able to reprint the out-of-print issues. Hopefully this situation will be alleviated in the future.

ERRATUM, *The Plaster Jacket* Number 33

Page 5, lines 14-15 should read; "This one fauna is called the I-75 fauna because it was unearthed during construction of Interstate 75 near Gainesville."

(Bruce J. MacFadden, Editor)

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COLLECTING FOSSIL MAMMALS IN THE GREATER ANTILLES:

AN IMMENSE JOURNEY

Charles A. Woods¹

The Greater Antilles comprise a cluster of islands south of Florida that include Cuba, Jamaica, Hispaniola, Puerto Rico, and the Bahamas. The islands are well known for their splendid birds and reptiles, but the land mammal fauna of the islands today is limited to a few rare forms of endemic creatures dominated by rats, mice, and the mongoose, which have been introduced by humans.

The surviving endemic land mammals include three genera of rodents and one genus of insectivore. The latter group has only two species; one in Cuba (*Solenodon cubanus*) and one in Hispaniola (*Solenodon paradoxus*). The rodents present a more complicated picture. The genus *Geocapromys* is represented by two widely separated populations. One

exists on a small island in the Bahamas (*G. ingrahami*) and the other in the mountains of Jamaica (*G. brownii*). The genus *Capromys* is confined to Cuba and contains several species. In Hispaniola the genus *Plagiodontia* is found in the mountains of Haiti and the Dominican Republic. Puerto Rico does not have any surviving endemic mammals. Therefore, this beautiful cluster of islands, which has a combined land area of 87,253 square miles, has only several species of native mammals, most of which are never seen by visitors or residents of the islands.

In 1972 I began field work in Haiti to study the natural history of the rodent *Plagiodontia*. The animal is called the "zagouti" in Creole, the local patois of Haiti. Haiti provided a difficult introduction to field work in the Antilles. The roads at that time were all muddy paths through the cane fields and mountains. Few mammalogists have ever worked in Haiti, and there is no tradition of natural history that would produce local naturalists who are interested in the animals of the countryside. Few people in Haiti appreciate the variety of animals in their country or are able to differentiate between them. For example, all warblers are called "ti chit," and the name "zagouti" is applied to the insectivore *Solenodon paradoxus*, the rodent *Plagiodontia aedium*, and even the large iquand lizard *Cyclura cornuta*. It has taken years of work to develop an accurate understanding of the distribution, natural history, and status of *Plagiodontia*. An incident that occurred one day in 1978 illustrates the circumstances in which natural historians work in Haiti. A group of farmers brought me a three-foot long male lizard, *Cyclura cornuta*, of considerable weight and with an unfriendly disposition. The unfortunate creature was bound to a long pole carried on the shoulders of two men followed by a group of about twenty assistants. They all insisted that this was a "zagouti" and were very proud of their find. My insistence that the zagouti I was seeking had hair resulted in their observation that the beast had hair when they caught it, but that the hair and the ears must have fallen off while they were carrying the animal to me. Haiti is not an

¹ Charles A. Woods is Chairman and Associate Curator of Mammals in the Department of Natural Sciences, Florida State Museum, and Associate Professor of Zoology, University of Florida, Gainesville, FL 32611.

easy place to study wildlife, but it is one of the more colorful and unique places that a biologist could choose to work.

As the years have passed, my work has drawn me back to Haiti and other areas in the Caribbean. Even though there are few native mammals existing today, there were fascinating accounts by early Spanish explorers that mention such creatures as the "hutia," the "quemi," the "mohuy," the "cori," and others. My quest to find out what kinds of animals these were led me into years of searching for caves and fossils in remote areas of Haiti and the Dominican Republic and to an analysis of the fossil mammals of Hispaniola.

Conditions for the preservation of animal remains in most of the Greater Antilles are poor because of shallow soils, mountainous terrain, and abundant rainfall. However, bones found in cave deposits that have been protected from the elements are occasionally preserved in excellent condition. Caves provide information on the nature of the early mammals of the area for several reasons. Over a period of many years, feeding deposits from owls ("pellets") build up to substantial levels on the floor of caves and represent a good sample of selected animals living in the region. The bones were originally deposited after owls fed on animals in nearby regions and returned to the cave to digest their food and regurgitate a pellet of fur and bones. Other reasons that caves are associated with fossil remains are that some mammals live in caves and also caves were used by early Indians as cooking areas and middens. For all of these reasons, caves have been a productive place to search for faunal remains and have produced a record of the kinds of mammals that were found in Hispaniola and the other Antillean islands.

The sample of bones collected in caves is only fair. Indians selected certain varieties of mammals to eat, and not all mammals live in caves. In addition, the remains of animals eaten by owls were influenced by what species of animals the owl was capable of capturing.



Left: The zagouti, or rodent *Flagiodontia*, from Haiti. Right: Typical site inside a Haitian cave where fossil mammals have been collected.

For example, it is clear that a small owl is not able to capture a large mammal. The predator that is usually encountered in caves on the Greater Antilles is *Tyto alba*, the barn owl. This is a small owl, but in the cave deposits the bones of a much larger extinct owl called *Tyto ostologa*, or the giant barn owl, have been found. We have also found the remains of an extinct giant eagle, *Titanohierax gloveralleni*. In Cuba, the remains of an enormous eagle have been reported, as well as an even larger barn owl, *Tyto riveroi*, and a gigantic owl, *Ornimegalonyx oteroi*, which might have been flightless. It is apparent that these predatory birds were capable of feeding on large mammals and transporting their remains to caves.

It sounds easy to go to a cave and spend several days digging for bones. In Hispaniola this task is pleasant, but it is far from easy. Few caves are well suited for owls because they prefer caves with tall entrances, large chambers, and several high pockets in which to safely spend the day. Many caves must be investigated in order to find the right combination of conditions and history. Caves that are well suited for owls are also well suited for bats. A large colony of the fruit-eating bat *Artibeus jamaicensis* will frequently disturb an owl enough that it will avoid a cave, and the guano produced by the bats will adversely affect the preservation of fossils. As a result of the difficulty of finding good caves, an investigator is forced to look farther afield, going into remote areas that are considerable distances from roads and cities. Our work frequently takes us along the narrow network of trails that crisscross Haiti and into tiny mountain villages where few non-Haitians have ever been. All equipment must be carried on our backs. Food and water are a problem, and shelter must be arranged, or carried with us (tents). We have often camped in the dooryards or fields surrounding a Haitian Caye (usually a single-roomed house with a thatched roof). Sitting crosslegged in the dust of a Haitian dooryard talking to the peasant family of their garden or their children is a special time that makes these ventures worthwhile.

Haitian peasants are part of a world long gone by in most parts of the highly civilized world and malaria, dengue fever, hepatitis, polio, tuberculosis, dysentery, and malnutrition are omnipresent.

The caves of Haiti are located by searching for suitable geological areas and by asking questions of local natives. The latter presents a special problem, because caves are often associated with voodoo ceremonies in rural Haiti, and because the natives have a fear and distrust of caves and sinkholes. We have worked in cave excavation sites as voodoo ceremonies were taking place around us, and once a half-crazed group tumbled into the pit on top of us as we worked on our hands and knees. The bones have not come easily, but the years have produced many good stories and a feeling for rural life in Haiti and the Dominican Republic.

Once a cave is located we study its architecture in order to visualize where concentrations of bones might be located. These include basins, sinks, alcoves under ledges, or recesses in the rocky cave floor. After digging a series of exploratory pits to establish the presence and distribution of fossil remains, we decide the size and extent of the excavation. There are always many people standing around watching these deliberations, especially in Haiti. The constant presence of people crowding around us as we work is sometimes very frustrating, but is a way of life in Haiti. The natives scramble about picking up debris and the bones of domestic animals that often can be found in caves. More than once my explanation that we are looking for bones of a little creature resulted in the bones of a large domestic animal being broken into small pieces and returned to us.

Our objective is to collect the fossil remains in such a way that all useful information is retained. Soil is carefully dug and sifted through screens of different-sized mesh in order to remove dirt, rocks, and other debris, but to concentrate fossil remains. Special

attention is given to recording the exact location and depth of each collection. We make maps and take extensive notes of each aspect of the excavation so that we can construct the exact position of bones in later work back at the Museum. We also record the names of all people who have been especially helpful, since it is common to return to an especially good cave several times, sometimes years later. The material is placed in carefully labeled plastic bags and returned to the Museum for preparation and analysis. "Returned to the Museum" sounds easy, but often involves backpacking hundreds of pounds of material over mountains along treacherous trails. Our peasant guides and assistants often say: "Ou samblé burik" (You are like a donkey), as they watch us struggle with our equipment and collections.

The collections have revealed the presence of many animals in Hispaniola and the other islands of the Greater Antilles. Until long after the first Indians arrived on the island over 5000 years ago a variety of insectivores, rodents, and sloths lived on most of the islands. In Hispaniola for example we have found six closely related rodents that range in size from a Guinea pig to a large raccoon. These rodents had distinct differences in the morphology of their teeth and skulls that were almost certainly related to their food habits. All are in the family Capromyidae. In addition to *Plagiodontia aedium*, which still survives and feeds on leaves and roots, the following now extinct forms are known from cave deposits in Haiti and the Dominican Republic. Their size and food habits have been deduced from their morphology.

Plagiodontia ipnaeum (large and thin, fed on leaves)

Plagiodontia araeum (large and heavy, fed on bark)

Isolobodon portoricensis (small, fed on grass and leaves)

Isolobodon montanus (large, fed on bark)

Hemilobodon phenax (large, fed on grass and leaves)

Plagiodontia aedium is occasionally eaten by Haitians, and is considered a delicacy. I believe that all of the

extinct hutias were also good to eat and most were easy to capture. Since there are no native carnivores in the Antilles, the rodents evolved in a semiprotected environment safe from all predators, except owls and large snakes. These unwary creatures were probably heavily preyed upon by early Indians, which may have led to their extinction. *Isolobodon portoricensis* was kept as a domestic animal by Indians and transported in their canoes to Puerto Rico and the Virgin Islands, where their remains are common in kitchen midden deposits. Remains of rodents in the rat-like family Echimyidae have also been found in Hispaniola, and their bones are so fresh in some cases that I suggest the animals may have only recently become extinct. This animal is known as *Heteropsomys voratus* and is similar in morphology to the spiny rats of Central America. We have also found the remains of a large rodent that was the size of a small pig. The animal was too large to have been captured by owls and therefore is rare in cave deposits. We do not understand much about the anatomy or relationships of this animal, *Quemisia gravis*, but it is assumed to be in the rodent family Heptaxodontidae. This heavily built creature probably resembled a paca or even a capybara.

The insectivores of the island of Hispaniola were very interesting and diverse. In addition to the extant *Solenodon paradoxus*, we have found another *Solenodon*-like form that is smaller and more robust. This powerful insectivore was the size of a large pocket gopher and was named *Antilloegale marcanoii* by the late Dr. Brian Patterson of Harvard University. There were also three small insectivores of the genus *Nesophontes* that ranged in size from a small shrew to a rat. The remains of these animals are abundant and, in some cases, so recent as to suggest the creatures may still survive in remote areas of the island where rats and the mongoose have not yet penetrated. It is clear, therefore, that even though only one living insectivore is currently known from Hispaniola, five insectivores inhabited the island until well into this century.

The last group is surely the most unusual and spectacular. These are the sloths, and the fossil remains of these creatures are exciting to find. The largest of the sloths known from Hispaniola was the size of a black bear, and their large remains are a striking contrast to the small bones of rodents and insectivores. We have found complete skeletons of these creatures, and there are accounts by early explorers that the Indians knew of the presence of these large beasts. They must have been extremely easy to kill and were probably hunted in great numbers by Indians. We are presently determining how many different forms were present, and how the forms in Hispaniola relate to the sloths of Cuba and Puerto Rico. We do know that there are four size groups represented and they range from that of a small dog to that of a bear.

The native land mammals found in Hispaniola are most similar to those found in Cuba, where closely related insectivores, capromyid and echimyid rodents, and ground sloths have been found. The fauna of Puerto Rico is also similar; however no native capromyid rodent nor *Solenodon* has been reported. The land mammal fauna of Jamaica and the Bahamas is quite different, and these islands lack insectivores, certain rodents, and ground sloths.



Left: On the road after a long day of field work.

The fossils of cave deposits are often recent looking, having been deposited within the past 10,000 years in most cases. Only rarely has older material been found in the Antilles. Since caves, like lakes, undergo constant evolution and change, it is unlikely that we will ever find fossil material in an existing cave that is older than a million years. We are currently looking for early Pleistocene and Pliocene deposits in suitable areas of Hispaniola in order to understand the kinds of early mammals that might have given rise to the kinds of subrecent mammals we are finding.

This essay is subtitled "An Immense Journey" for several reasons. Firstly, even though the islands of the Greater Antilles are close to Florida, they are far removed by culture and history. Haiti, for example, has remote areas where life is much as it was at the time of its independence from France in 1804. Secondly, "An Immense Journey" is also required to get in and out of the remote areas of these countries. Thirdly, an even more immense journey, however, was involved in the colonization of these islands by the animals. Early ancestors of the insectivores may have found their way into the area as long ago as the Eocene. The rodents and ground sloths surely came from South America, perhaps as early as the Miocene. In summary, this was an immense journey through time and space, and the land mammals of these islands may represent the last remnants of ancient animals that became extinct much earlier in North and South America. In this I am reminded of a passage in the splendid book by Dr. Loren Eiseley entitled The Immense Journey. He found a skull in the bank of a narrow ravine, and he described his feelings as he squatted on his heels in the narrow ravine. "We stared a little blankly at each other, the skull and I," he remembered. I too have squatted on my heels and stared blankly at creatures long extinct and experienced time long gone by!