The PLASTER JACKET is a newsletter. Questions, announcements, and other communications are solicited from all readers. Information of general interest will be included in future issues.

It is our intent to produce this series at the rate of six issues per year. We hope to add as many genuinely interested paleontologists as possible to our mailing list. If you are interested, please send your name and address to the PLASTER JACKET. These issues are distributed free of charge to all interested people.

This public document was promulgated at an annual cost of $2500 or $0.17 per copy to circulate authoritative material on Florida paleontology and to foster communication among enthusiasts of this subject.

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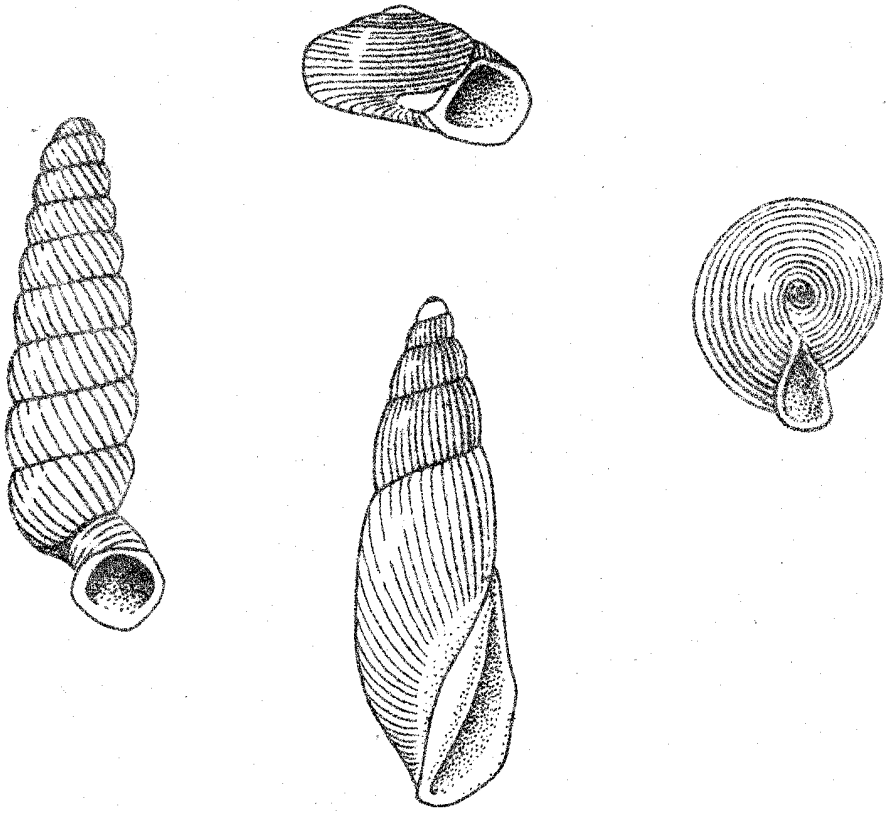

THE FLORIDA STATE MUSEUM

LAND SNAILS AND ZOOGEOGRAPHY — THE CAYMAN ISLANDS

by Fred G. Thompson

The Caymans are three small West Indian islands about halfway between Cuba and Jamaica or about 160 miles from either. Grand Cayman, the largest of the three, is about 20 miles long and 6 miles wide at the widest point. Cayman Brac and Little Cayman Island are both about 10 miles long and a mile wide. Cayman Brac forms a bluff rising from the sea about 300 feet. The other islands are lower, with little topographic relief and have a maximum elevation of about 60 feet on Grand Cayman and 30 feet on Little Cayman. All of the islands consist of deep igneous cores capped with thick limestone deposits.

The islands are unique within the Antilles because of their remoteness from other land masses. The distance is greater than that which separates any other Antillean island from its nearest neighbor, being great enough that it has been an important barrier to the natural but accidental immigration of animal groups from other places; whereas many have reached other Antillean islands with less difficulty. This separation has given the islands an impoverished and imbalanced fauna which is more nearly similar in structure to truly oceanic islands, such as the Solomon Islands, than are other Caribbean land masses.

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In addition to geographic remoteness the small size of the Cayman Islands is also a factor contributing to a meager vertebrate fauna. Small islands are characteristically unable to maintain an indigenous vertebrate fauna over long periods of time, and they have a stable and nearly uniform environment that is very limited in its carrying capacity. Any environmental change usually is disastrous to terrestrial vertebrates adapted to that island's environments. Such islands depended on the continuous introduction of new animals in order to approach a balanced biota, no matter how infrequently or unlikely these introductions may be.

Because of important questions they pose relating to ecology and zoogeography, the Cayman Islands are particularly interesting among West Indian islands. How old are the islands? How long have they been emerged above sea level? What is their origin? Has continental drift affected their position within the Caribbean region? How long have the islands been populated with their present fauna? What is the land source from which the present fauna originated? How did these animals get to the Cayman Islands? Did other groups of animals exist there in prehuman times which may have been exterminated by early man?

With these questions in mind, staff members from the Florida State Museum (Richard Franz, Graig D. Shaak, and Fred G. Thompson) initiated studies on the paleontology and zoology of the Islands. Deposits containing vertebrate fossils were anticipated. At least two of the islands have caves that might contain deposits of Pleistocene fossils. The modern vertebrate fauna was well known, but the modern land invertebrate fauna required further investigation before its

biogeographic significance could be analyzed.

The present impoverished vertebrate fauna offers few clues to the questions posed above. Of the 155 species of birds known from there, only one is endemic, an extinct thrush. All others are migrants, or widespread species found on other islands. Bats are the only native mammals, and all are widespread elsewhere in the West Indies. There are two species of amphibians. The two frogs found on the islands probably were recently introduced from Cuba. Of the sixteen species of non-marine reptiles found, only six are endemic- four small lizards and two small burrowing snakes. One snake (Tropidophis caymanensis) feeds on small lizards and the other (Typhlops caymanensis) feeds on larval insects. Geological deposits containing vertebrate fossils (Late Pleistocene in age), have yielded only small reptile, bird, and bat bones. There is no indication that a richer fauna occurred there in the past.

Clearly the vertebrate fauna offers little information relating to the geological origin and antiquity of the islands. Invertebrates, principally terrestrial snails, are the only component of the fauna that provides a sufficient basis for biogeographic studies. Information on the systematics and faunal distribution of West Indian arthropods is so rudimentary and sketchy that additional studies are necessary before their distribution patterns can be analyzed. On the other hand, the land mollusks of the West Indies are sufficiently known that biogeographic interpretations can be deduced about the molluscan fauna of the Cayman Islands. Of the 55 species recorded from the Cayman Islands, 37 are endemic and 12 are not. The non-endemic entities are

mostly species that are known or strongly suspected to have been introduced by humans during recent times. They tend to be small and closely associated with human habitations and are known in the "shell game" as tropical tramps.

The high endemism of the land snails is not due to rapid evolution of land snails as one might first suspect. As it is well documented in other regions of the world, species evolution in mollusks occurs at a much slower rate than it does in vertebrates. Of the species found in Pleistocene deposits all are extant species, and only one is a non-endemic species. Clearly, rapid evolution cannot account for the large number of endemics. The Cayman Islands must have been above sea level for a time span considerably greater than the Pleistocene to allow for this high endemism.

Among the endemic snails three patterns of zoogeographic relationships are indicated: 1) the Caribbean in general, 2) Cuba, and 3) Jamaica. Five species are related to groups widely distributed in the Caribbean, and show no particularly close affinity to species found on other islands. In these cases evolution has proceeded to such an extent that close species relationships are no longer clear. Such animals are not particularly useful for demonstrating insular relationships, but they do indicate that a long time span must have existed during their evolution from common ancestors in Jamaica, Cuba, or elsewhere.

The second group of endemics, species showing relationships with Cuba, also contains five species. Interestingly, all are closely related to their counterparts in Cuba, and all belong to genera that are common and widespread on coastal islands and cays along the Cuban shore. Apparently such species are relatively easily introduced into new areas by adventicious means. The natural introduction

of these species into the Caymans appears to be a phenomenon that occurred in relatively recent geological times and clearly is the result of natural accidents.

The remaining group of Cayman endemics contains 27 species that show affinities exclusively with Jamaica. Some, such as Geomelania, Varicella, and Fadyenia, have undergone an extensive and remarkable evolution in the Caymans and formed natural species groups that are distinct but related to other species groups in Jamaica. This extensive and highly differentiated evolution can be accounted for only over a long span of time, certainly much more than the Pleistocene would allow, and probably included at least the Pliocene as well.

Several conclusions can be drawn from the modern land snail fauna of the Caymans. 1) The present indigenous fauna existed on the Cayman Islands at least through the Pleistocene, and probably for a much longer time. Furthermore, no other extinct species are known from the Pleistocene. 2) The present snail fauna is derived from Jamaica, except for those few forms that accidentally were introduced by natural means from Cuba and elsewhere, or those species that were introduced by man. 3) The close Jamaican affinity of the fauna suggests a former connection with Jamaica. Otherwise it is difficult to account for the mutual distributions between these islands of genera or subgenera that do not occur elsewhere. There is some evidence provided by plate tectonics to support such a hypothesis. The Bartlett Trough, which separates the Caymans from Jamaica, apparently originated in the early Miocene or Oligocene and has been spreading since then, moving these islands farther apart. 4) The islands are old. They were never completely covered by water during the Pleistocene or even the Pliocene, and probably were dry since the Miocene. Such dry land was necessary for the fauna to have evolved as extensively as it has.

VALUABLE FOSSIL SITE EXCAVATED

Several years ago a valuable sample of fossils was found at a site southwest of Inglis, Florida on the Withlacoochee River and brought to the attention of Jean Kline, then a Geology graduate student at the University of Florida.

Although the site has been worked since 1967, total excavation was only recently possible, because the site lay mostly below sea level. But this past January, when daytime tides hit their lowest ebb in many years, a large-scale excavation was begun. Because of the controversy over the Cross-Florida Barge Canal, any work in the area was prohibited by a court injunction. Dr. S. David Webb and his Museum crew finally received permission from the Federal Circuit Court in New Orleans just in time for the low tides, and the site (its bottom six feet below sea level) was successfully excavated. The fossil-laden matrix brought back to the Museum contains an incredible diversity of large and small vertebrates. The fauna seems to be about one million years old, or early Irvingtonian in age. Some of the animals (including the oldest megathere sloth in North America) had arrived here across a land bridge from South America at that time. Others are probably the North American ancestors of animals that spread to South America about the same time.

Curation and study of this vast collection will require many years. PLASTER JACKET readers will be kept informed from time to time of interesting aspects of these studies as they develop.