The Monkey Caves of Cuba

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Abstract: Two small caves in western Cuba—Cueva del Mono Fossil and Cueva Alta in the eastern part of Sierra de los Organos—have yielded remains of a hitherto unknown (and now extinct) playtherine monkey, Parad tomia vainoni. These sites represent the first new monkey localities to be reported from this island since 1918. This paper provides surveys and descriptions of the Parad tomia caves sites in light of fieldwork conducted in 1990 and 1991.

Evidence is accumulating that parts of the West Indies were a significant centre of primate evolution and diversification (MacPhee and Fleagle, 1991). Although none of these islands has native primates today, three of the Greater Antilles—Jamaica, Hispaniola and Cuba—had one or more endemic species in the recent past (Ford, 1990). Interpreting the phylogenetic relationships of these monkeys has proven difficult, partly because of the paucity of good material, but also because of the unusual trait combinations of some species (e.g. Kenethrex m egregius; MacPhee and Fleagle, 1991) that suggest very distant separation from surviving continental clades. Radiometric evidence indicates that at least some of these island primates survived well into the late Quaternary; it is possible that all of them—together with dozens of other vertebrate species—became extinct shortly subsequent to the entry of humans into the Caribbean, c. 5000 bp (MacPhee et al., 1989; Morgan and Woods, 1986; Roule and Allaire, 1978). Cave deposits are virtually the only context in which remains of extinct Quaternary vertebrates have been discovered in the West Indies. Because most primates (and all New World platyrhines) are forest-dwellers, it is unsurprising that primate fossils are extremely rare in such depositional settings. Accordingly, new discoveries merit special notice. In this note we present a brief account of caves in Sierra de los Organos of western Cuba that have recently yielded remains of a hitherto unknown primate, Parad tomia vainoni (Rivero and Arredondo, 1991).

CONTEXT AND CAVE DESCRIPTIONS

Sierra de los Organos is composed of isolated, cave-walled limestone hills with flat or gently rounded tops—the classic karst landscape for which the term “mogote” was first developed (Montejo, 1976). The folded and tilted rocks comprising these mogotes are mostly of Late Jurassic (Malm) age, and are famous for rich ammole line faunas contained in widely-outcropping Guayasa and Jaga Formations (Wierbowski, 1976). Substantial cave development is common in these limestones, and for this reason the mogotes of Sierra de los Organos have received considerable attention from Cuban speleologists and sport cavers (Nolch Jiménez et al., 1984; Jaimez, 1990).

The mogote of chief interest in the present context is Sierra de Galeras, an elongate block situated in the eastern part of the Organos, some 4 km west of Alba de Ancón, Vidales municipality, province of Pinar del Río (Figure 1). The largest known cave system in Galeras is Gran Caverna Constantino, a large, complex river cave whose main passage runs completely through the middle portion of the mogote (total length so far explored, 10 km). Constantino communicates with Cueva del los Petroglifos, another cave system on the northern flank of Sierra de Galeras and historically important for its Indian petroglyphs. Of the 17 known entrances into the Constantino system, the largest is the “main” entrance, the sink of the cave’s river, Río Constantino (Figures 2, 3). This entrance, 20 m in height at the sill, is a large cliff on the south face of Galeras. On the western side of and communicating with this entrance are two much smaller caves, Cueva del Mono Fossil and Cueva Alta—the only known provenances of the newly discovered fossil Cuban monkey Parad tomia vainoni (Rivero and Arredondo, 1991).

Cueva del Mono Fossil


The entrance to Cueva del Mono Fossil (Figure 4) is located SW of the western lip of the main entrance of Caverna Constantino, approximately 3 m above the valley floor. The entranceway opens into a low, sloping chamber that continues horizontally into the hillside. The floor lacks appreciable sediment but the walls carry discontinuous shelves of pebbles and clay, indicating the former presence of a stream channel. Approximately 10 m from the entrance floor is interrupted by a narrow, longitudinal fissure.

Figure 1. Location map of known monkey localities in Cuba. MF: Cueva del Mono Fossil and Cueva Alta (Sierra de Galeras), where Parad tomia vainoni (Rivero and Arredondo, 1991) was recently discovered. BP: Boca (or Cueva) de Portal (Cerro de Escambray), still the only locality known for Ateles amylostapheus (Ameubahia, 1980).
23 m deep, which evidently opened subsequent to the period of stream activity. Other fissures, probably related to the same faulting episode, occur deeper within the cave (which ultimately links up with Cueva de los Petrolíferos). Unlike the first fissure, these other fissures (not illustrated in Figure 4) contain permanent pools of water up to 5 m deep.

The first fissure was descended in August of 1987 by members of the Grup Espeleológico “Pedro Borrás” (GEPB) who were then trying to ascertain whether it connected with Caverna Constantino. Upon descent, mud-encased bones were immediately encountered on the fissure's floor. A few minutes work resulted in the freeing of a quantity of varied remains, including specimens of Crocodylus, Megachirella and Capromys, all well-known taxa typical of the Cuban Quaternary (Table 1). By far the most important find, however, was the well preserved and nearly complete skull of a previously unknown platyrhine monkey (Figure 7), later named Pardoulostia varonai.

(Rivera and Arredondo, 1991). Further scrutiny of the fissure sample led to the identification of another bone attributable to the monkey, an incomplete humerus. In cooperation with the American Museum of Natural History and the Museo Nacional de Historia Natural, collecting trips were made to Cueva del Mono Fósil in 1999 and 2001 for the express purpose of finding additional primate material. Although small quantities of vertebrate remains were recovered (including some from one of the deep pools), no further primate remains were encountered in this cave. Any future exploration of the fissures will require diving gear.

Although it is possible that some of the remains found at Cueva del Mono Fósil represent individuals that actually fell into floor fissures or were dropped there by raptors, it is far more probable that these bones were secondarily deposited, having washed out of some other, higher part of the cave. We were unable to locate a likely source, however. The excellent preservation of the skull of...
F. varonai strongly suggests that it could not have fallen very far. Perhaps it was brought in along one of the side passages that open into the fissure (question marks in Figure 4); these are choked with indurated brecciated deposits at present and could not be investigated.

Cueva Alta

Coordinates: as for Cueva del Mono Fósil. Altitude: 59.8 m. Length: 27 m explored.

The entrance to Cueva Alta (Figures 5, 6) is located immediately inside the western edge of the lip of the main entrance of Caverna Constantino, thus very close to but some 4 m higher that the entrance to Cueva del Mono Fósil (and 15 m higher than the present level of Rio Constantino). Whether it opens into the latter is not known. The foreport of the cave consists of a small balcony that continues on into a small chamber, deep filled with sediments and ending blindly 5 m horizontally further on. The way on consists of vertical shafts that pass upward from the chamber roof, some of which have been ascended for a few tens of meters.

While exploring the entrance to this cave in March of 1980, GEP plans encountered several postcranial elements at shallow depth. Some of these proved to be primate, and, accordingly, when work in Cueva del Mono Fósil was completed in the July expedition of the same year, our team moved to Cueva Alta. It soon became evident that the material recovered in March had washed out of a narrow, chimney-like fissure located in the rear of the entrance chamber (Figure 5), because the slightly indurated sediment in this chimney was replete with isolated teeth of the monkey as well as an assortment of other vertebrate remains. No other fosilliferous areas were found then or later within this cave. The fissure fill is a chaotic clay and gravel conglomerate with no detectable stratification, and it is likely that it has been secondarily deposited, together with the fossils it contains, from some higher position in the cave.

Sediment was exposed only at the mouth of the chimney, but with hammer and chisel we were able to remove a fair quantity for dry-screening. Approximately 70 primate fossils mostly isolated teeth were recovered from screening operations. Although a few in number, these remains are important because teeth are particularly critical for systematic assessments. In July of 1991 we returned to Cueva Alta, hoping to remove additional material from the chimney with better tools. However, it was found that the chimney rapidly narrowed, and in all only 11 more primate teeth and a few long bone fragments were recovered.

One of the interesting things about the isolated monkey teeth from Cueva Alta is that nearly all of them have been worn to a high polish. Although it is conceivable that such a polish might be imparted to fossils in a turbulent pool filled with a very fine-grained sediment, it is more likely that the fossils suffered wear as a result of passing through a carnivore's gut. The likely culprit is Crocodylus, remains of which have been found in Cueva del Mono Fósil, although it should be noted that these caves have also yielded remains of two of the enormous extinct crocodiles that lived in Cuba during the Quaternary (Table 1; Arredondo, 1972, 1974).

Analysis of coarse fractions from sediments in which the vertebrate fossils were contained reveals that they consist mostly of quartz grains and modules composed of iron hydroxide (SiO₂ + Cuva del Mono Fósil, 70.80%; Cueva Alta, 60%; Cueva Constantino, 70%). Identification of quartz was confirmed by X-ray diffraction. The high load of quartz in the sediments presumably originate from sandstones of the Son Cayetano Fm. and not from the limestones of Sierra de Galeras per se. If the quartz was brought in by rivers, their beds must have stood at higher levels than the current bed of Rio Constantino. This, along with other indications that the higher galleries of Caverna Constantino were cut by river action, implies that this cave system is relatively old.

DISCUSSION

Considered in light of other West Indian fossil monkey sites, the Parahoutu walla caves have been quite productive. As with many of these other sites, only one or two bones or teeth attributable to primates have been recovered, which in some instances has severely complicated systematic interpretation (Ford, 1990; MacPhee and Fleagle, 1991). Although only a single skull of Parahoutu has been found so far, the total sample for this taxon is already several times better than for any other endemic Caribbean monkey.

Parahoutu is currently interpreted as a relative of Alouatta, the living howler monkey of South and Central America (Rivero and Arredondo, 1991). As such it is the first member of its particular clade (tribe Alouatini) to be identified in the West Indies; other finds on other islands have been variously linked to marmosets (Callithrichidae), titis (Callicebinae), cebines (Cebinae) and spider monkeys (Ateles)
monkeys (Atelini). The only other confirmed endemic primate from Cuba is the species originally named Monteserratta antropomorpha (Angeles, 1910), from very incomplete material recovered at Cuaba (or Boca) del Pinar in the Cordillera de Escambray in south-central Cuba (Figure 1). A much less distinctive form than P. varianum, the Cuban form has recently been transferred to the living spider monkey genus Ateles (as anthropomorphae; Arredondo and Varona, 1983). Although howler monkeys and spider monkeys are generally considered to be each other's closest relatives (Kyp. 1990), their lineages split early; monkeys of uncontested aloinait aspect are known from the Miocene of Colombia (Kay et al., 1987). Although there is no evidence bearing on the time at which the ancestors of the Cuban monkey colonized the island, terrestrial environments clearly existed on the proto-Cuban archipelago in the Eocene, and in central Cuba land vertebrates and plants have been identified in terrestrial facies of Early Miocene age (Iurralde-Viastel, 1984; MacPhee et al. in press). At this stage of knowledge, the most concrete inference that can be made about the West Indian platyrhinines is that their known diversity practically demands the conclusion that several different initiators made the trip (MacPhee and Fleagle, 1991). Most extant species of platyrhinines have rather large geographical distributions. Accordingly, it is puzzling that remains of Panamadina have not turned up at any of the rich Quaternary sites in western and central Cuba (cf. Acevedo and Arredondo, 1982). One possibility is that the fossils from Cueva del Mono Fossil and Cueva Alta are older than those known from elsewhere on the island. This argument would appear to be hard to defend, however, because with the exception of undescribed sloth and orangemarmoset remains from Cueva del Mono Fossil (O. Arredondo, pers. comm.) that may represent new species, the faunal list for the monkey caves is exclusively composed of known taxa, some of which appear to have died out very recently indeed (e.g., Neopithecus). An alternative possibility is that the restricted distribution of Panamadina was conditioned by environmental factors. The phytogeography of western Cuba indicates that this part of the island is markedly distinct in ecological character (Borhi, 1982), but even so it is difficult to believe that an animal like Panamadina should have been limited to one part of Cuba while other Quaternary taxa (such as for the highly xerophilic sloths) shows no such areal restriction.

Although it is reasonably certain that Panamadina was a "Quaternary" monkey, it is not yet possible to estimate when it finally became extinct (and probably will not be until several additional localities are discovered). Associated sloth bones from Cueva del Mono Fossil turned out to be too low in organic material for conventional 14C dating (M. Tamers, Beta Analytical, pers. commun.). Lack of adequate collagen and allied proteins in bone samples may be an indication of significant age, but much younger bones can yield the same analytical result as a consequence of diagenesis and deterioration. Future prospecting efforts in the monkey caves of the Sierra de Galeras will be aimed at finding good bone-caliche associations for uranium-thorium disequilibrium dating, a technique which has a much wider