1-1-2000

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Donald A. McFarlane
Claremont McKenna College; Pitzer College; Scripps College

Abel Vale

Keith Christenson

Joyce Lundberg
Carleton University

Gabriel Atilles

See next page for additional authors

Authors
Donald A. McFarlane, Abel Vale, Keith Christenson, Joyce Lundberg, Gabriel Atilles, and Stein Erik Lauritzen

Caribbean Journal of Science, Vol. 36, No. 1-2, 163-166, 2000

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DONALD A. MCFARLANE[1], ABEL VALE[2] , KEITH CHRISTENSON[3], JOYCE LUNDBERG[4], GABRIEL ATILLES[5] AND STEIN-ERIK LAURITZEN[6]. [1]*W.M. Keck Science Center, The Claremont Colleges, 925 North Mills Avenue, Claremont CA 91711-5916 USA,* [2]*Fundacion de Investigaciones Espeleologicas del Karso Puertorriqueño (FIEKP), 497 Ave. E. Pol, Box 230, San Juan, PR 00926-5636,* [3]*327 Ridgecrest Drive, Daleville, VA 24083 USA,* [4]*Department of Geography, Carleton University, Ottawa, Ontario, K1S 5B6 Canada,* [5]*Museo del Hombre Dominicano, Plaza de la Cultura, Santo Domingo, Dominican Republic,* [6]*Geological Institute, University of Bergen, Bergen, Norway N5007.*

During the late Quaternary, the island of Hispaniola supported one of the most diverse mammalian faunas in the West Indies. Much of this diversity was lost to extinction in the past 100,000 years, but the timing of these events is poorly known. Here we report the paleontological findings of a multidisciplinary investigation of caves in the central Dominican Republic. These findings include new 'last occurrence' dates for the rodents *Isolobodon portoricensis* and *Brotomys* cf. *voratus* that take these genera to the dawn of the 'historic era'; a first record of a last-interglacial sloth, and the first report of the upper dentition of the giant heptaxodontid rodent *Quemisia gravis*.

Hispaniola is recognized as a center of diversification for endemic West Indian terrestrial mammals, hosting at least two and perhaps four genera of megalochnid sloths, one genus of primate, two genera of insectivores, and six genera of rodents. Nevertheless, paleontological fieldwork on the island has been sporadic. The earliest investigations were conducted by Miller (see references) and Poole (Poole, 1929). Rimoli (1976) provided a review of Hispaniolan rodents and later added an important primate fossil (Rimoli, 1977). Most recently, MacPhee et al. (1999) reported a 'last occurrence' date for the insectivore *Nesophontes paramicrus*.

In November 1998, paleontological fieldwork was conducted in support of a multidisciplinary investigation of caves in the vicinity of Presa de Hatillo, Sanchez Ramirez province, Dominican Republic (Fig. 1) that was jointly fielded by the Fundación de Investigaciones Espeleológicas del Karso Puertorriqueño (FIEKP) and the Museo del Hombre Dominicano, Santo Domingo. Of the 34 caves examined in a 4 km^2 tract of karst, five contained paleontological remains that are discussed here. Detailed discussion of the caves and their archaeological significance will appear elsewhere. Cave locations were determined using a differentially corrected Global Positioning System, with three-dimensional standard deviations of better than 1m, and are presented as universal transverse mercator coordinates.

Cueva Loma de Juan. UTM ^{N}21003131, ^{E}368267. Altitude 200 m. An open collapse pit 14 m deep, with a small area of cave sediment at the lower end that has not been buried by debris. A small excavation yielded abundant remains of *Isolobodon* cf. *portoricensis*, *Plagiodontia sp.*, and a single tooth (p^1) referable to *Quemisia gravis*.

Cueva Fito Santos. UTM ^{N}2100434 ^{E}368737. Altitude 109 m. An abandoned sink cave located above the modern sink of the El Botao polje. The cave contains significant numbers of pictographs and petroglyphs, and excavations yielded both ceramics and human bone. Fossils of *I. portoricensis* and *Plagiodontia sp.* were common in surficial sediments, together with a few remains of *Brotomys* cf. *voratus*, *Nesophontes sp.*, and a turtle.

Cueva Nay UTM ^{N}2100806 ^{E}369456. Altitude 124 m. An abandoned resurgence cave (Fig. 1) preserving a section of large trunk passage. A bat colony and attendant large volume of moist guano precludes fossil preservation on the floor of the cave, but a calcite shelf on the north wall preserves a remnant of a stream cobble deposit exposed by subsequent downcutting. This deposit yielded a well preserved vertebra referable to *Parocnus sp.* and a bat skull referable to *Brachyphylla sp.*.

Cueva Natura Bass. UTM ^{N}2101057 ^{E}369710. Altitude 104 m. A short (41 m) length of trunk passage with a deep sediment floor. Excavation in the surficial deposits yielded human bone and fragmentary ceramics. Fossils included *Brotomys* cf. *voratus*, *I. portoricensis*, and numerous reptile and bird remains.

Cueva Escalante. UTM ^{N}2101833 ^{E}369847. Altitude 123 m. A collapsed cave remnant frequented by owls. A small pocket of mixed sediment and owl-pellet debris yielded *Rattus rattus*, *Nesophontes paramicrus, N. hypomicrus, N. zamicrus, Brachyphylla nana,* and *Brotomys* cf. *voratus*. The stratigraphic relationship between *R. rattus* and *Nesophontes* could not be satisfactorily resolved, and damp conditions failed to preserve collagen for direct dating of the extinct species.

Recent investigations of extinct late Quaternary mammals throughout the West Indies have identified multiple bouts of extinctions. An undetermined number of these extinctions occurred at or shortly after European contact (~ AD. 1500), but the interpretation of this pattern hinges on assembling an extensive database of 'last occurrence' dates. Mandibles of *Isolobodon portoricensis* and *Brotomys* cf. *voratus* from the uppermost 3 cm of sediment in Cueva Fito Santos yielded sufficient collagen for accelerator-mass-spectrometry radiocarbon dating. Dates of 430 ± 60 rcybp on *Brotomys* and 710 ± 50 rcybp on *Isolobodon* (Table 1) represent the current 'last occurrence' dates for these two taxa. Calibrated calendar ages for both taxa are 'pre-Columbian', although the 95 % upper confidence limit on the *Brotomys* date is consistent with survival as late as 70 years into the historic era.

Excavations in Cueva Loma de Juan produced a characteristic assemblage of *Plagiodontia sp.* and *I. portoricensis*, together with a single tooth of a large caviomorph rodent recovered from a depth of approximately 30 cm. The specimen (Fig. 2) is identified as a

right upper premolar of the giant heptaxodontid rodent *Quemisia gravis* Miller, and represents the only known upper dentition for the genus. The anterior margin of the tooth is strongly convex, and the tooth is penetrated by two deep and tightly appressed re-entrant folds, one lingual and one labial. As in the lower dentition of the type specimen of *Quemisia* (US National Museum 253175), the anterior re-entrant fold traverses almost the whole width of the tooth but does not fully penetrate it. The second re-entrant fold bisects the tooth, creating an isolated plate of enamel as in the heptaxodontid *Elasmodontomys obliquus* Anthony of Puerto Rico. Maximum anterior-posterior length across the occlusal surface and perpendicular to the re-entrant folds is 4.88 mm and maximum labial-lingual breadth is 9.40 mm.

Cueva Nay consists of a sizable trunk passage that presumably was a former resurgence for water sinking in the polje to the west. Within the stream-cobble deposit, several mid-shaft long bone fragments of a large mammal were observed. A single, well preserved vertebra of a ground sloth was collected and is referred to *Parocnus*(?)(C. Flemming, pers. comm). Alpha-counted uranium-series-disequilibrium dating of this flowstone provided an age of 112 ,000 ± 6,000 years (1 sigma error; Table 2). The simplest interpretation of this date is that the sloth vertebra and stream deposit were deposited during the Sangamon Interglacial (oxygen isotope stage 5), an episode marked by fossil-bearing flood deposits on other West Indian islands (MacPhee et al., 1989; McFarlane et al., 1998). Although the presence of a sloth in an interglacial de-

FIG. 1. Location map showing the field area. Cueva Nay, located adjacent to the El Botao polje, is inset in plan view, (modified from a map drawn by A. Gilbert and A. Vale, 1998) with the interglacial sloth vertebra site indicated by an arrow.

TABLE 1. Radiocarbon dates for fossil mammals.

Species	Specimen	Specimen #	Measured ^{14}C age	$^{13}C/^{12}C$	Corrected ^{14}C age	1 sigma Cal. Age[1]	Collagen yield (%)
Botomys (*voratus?*)	Single hemimandible	DAM 98-07	340 ± 60	−19.2	430 ± 60	AD 1420–1520	2.4
Isolobodon portoricensis	Single hemimandible	DAM 99-01	660 ± 50	−22.0	710 ± 50	AD 1250–1310	7.6

[1]Cal. Age is the 14C calibrated age, dataset of Stuvier et al. (1998) implemented in OxCal 3.3 (Ramsey, 1999).

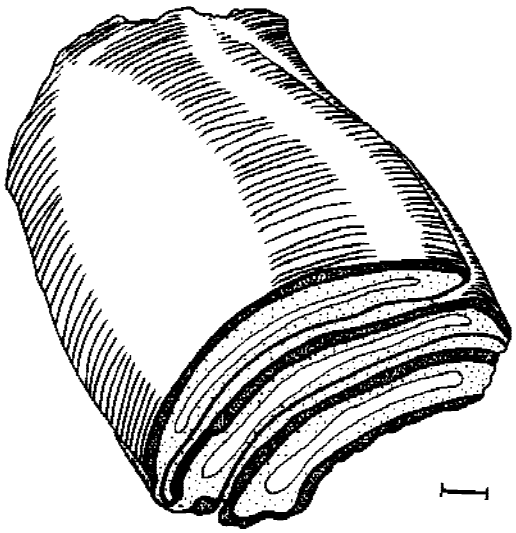

FIG. 2. Premolar of *Quemsia gravis*. Specimen is AMNH-VP132502 (American Museum of Natural History, New York). Scale bar is 1mm in length. Illustration by Molly Rightmyer.

TABLE 2. Uranium-thorium isotope data for the Cueva Nay flowstone (sample code DAM 98-05)

U content	0.341 ± 0.008 ppm
U yield	23.6%
Th yield	Th yield: 25.8%
Present $^{234}U/^{238}U$	1.0405 ± 0.02809
Present $^{230}Th/^{234}U$	0.6475 ± 0.02108
Present $^{230}Th/^{232}Th$	10000.0000
Initial $^{234}U/^{238}U$	1.055 ± 0.038
Calculated age	112.03 + 6.52 − 6.16 ka (1 sigma error)

The sample was analyzed by conventional alpha-counting in the speleothem dating laboratory, Geological Institute, University of Bergen.

posit is to be expected, this discovery is of interest because it is the oldest and only pre-Wisconsinan, radiometrically dated Quaternary fossil mammal yet reported from Hispaniola.

Acknowledgements.—Professor Dato Pagan Perdomo, Director General, Museo del Hombre Dominicano (MHD) kindly provided permission for the fieldwork. J. Rubio (MHD) assisted with all aspects of the work. Cave exploration and mapping was conducted by members of the Fundación de Investigaciones Espeleológicas del Karso Puertorriqueño (FIEKP), to whom we are most grateful. Clare Flemming (American Museum of Natural History) identified the Cueva Nay vertebra. Molly Rightmyer (American Museum of Natural History) illustrated the *Quemisia* tooth.

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