



General palaeontology, systematics and evolution (Vertebrate palaeontology)

## Fossil and subfossil herpetofauna from Cadet 2 Cave (Marie-Galante, Guadeloupe Islands, F. W. I.): Evolution of an insular herpetofauna since the Late Pleistocene



### *L'herpétofaune fossile et subfossile de la grotte Cadet 2 (Marie-Galante, Archipel de la Guadeloupe, P.-A. F.) : évolution d'une herpétofaune insulaire depuis le Pléistocène supérieur*

Corentin Bochaton<sup>a,b,\*</sup>, Sandrine Grouard<sup>a</sup>, Raphaël Cornette<sup>b</sup>, Ivan Ineich<sup>b</sup>, Arnaud Lenoble<sup>c</sup>, Anne Tresset<sup>a</sup>, Salvador Bailon<sup>a</sup>

<sup>a</sup> Muséum national d'Histoire naturelle (MNHN), UMR 7209 « Archéozoologie et archéobotanique : sociétés, pratiques et environnements » (CNRS), CP 56, 55, rue Buffon, 75005 Paris, France

<sup>b</sup> Muséum national d'Histoire naturelle (MNHN), ISYEB (UMR 7205 CNRS, EPHE, UPMC), CP 30, 57, rue Cuvier, 75251 Paris, France

<sup>c</sup> Université de Bordeaux, UMR 5199 PACEA, avenue des Facultés, 33405 Talence, France

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#### ABSTRACT

This study deals with the herpetofaunal fossil and subfossil remains from the Cadet 2 site (Marie-Galante, Guadeloupean Archipelago). This study provides new data concerning the herpetofaunal community since the Late Pleistocene by revealing the early local occurrence of some taxa (*Eleutherodactylus* sp., cf. *Sphaerodactylus* sp., *Ameiva* sp., cf. *Capitellum mariagalantae*, *Anolis* cf. *ferreus*, cf. *Antillotyphlops* sp., cf. *Alsophis* sp. and Colubroidea sp. 1) and possible Pleistocene extinctions (*Boa* sp. and Colubroidea sp. 2). Moreover, the first metric data for fossil Marie-Galante anoles show clear size stability throughout time. As regards the evolution of the island herpetofaunal biodiversity, our work points to the long-term stability of the fauna before human colonization and subsequently to the marked impact of human-caused environmental disturbances during colonial but also Pre-Columbian periods.

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#### RÉSUMÉ

Nous étudions ici le matériel herpétofaunistique provenant du site de Cadet 2, situé sur l'île de Marie-Galante, dans l'archipel de la Guadeloupe. L'analyse de ces restes apporte des données inédites concernant le peuplement herpétologique de l'île depuis le Pléistocène supérieur. Elle met en évidence la présence ancienne de certains taxons sur l'île (*Eleutherodactylus* sp., cf. *Sphaerodactylus* sp., *Ameiva* sp., cf. *Capitellum mariagalantae*, *Anolis* cf. *ferreus*, cf. *Antillotyphlops* sp., cf. *Alsophis* sp. et Colubroidea sp. 1). Elle montre aussi de possibles extinctions datant du Pléistocène (*Boa* sp. et Colubroidea sp. 2). Nos premiers résultats

\* Corresponding author at: Laboratoire "Reptiles et Amphibiens", 57, rue Cuvier, CP 30, 75005 Paris, France.  
E-mail address: [corentin.bochaton@mnhn.fr](mailto:corentin.bochaton@mnhn.fr) (C. Bochaton).

obtenus sur les faibles variations de la taille des anolis fossiles de Marie-Galante démontrent la grande stabilité des peuplements au cours du temps. Ce travail met en avant la stabilité de l'herpétofaune de l'île durant les périodes précédant l'arrivée de l'homme, puis les modifications considérables qui suivent son installation pendant les périodes précolombiennes, puis modernes.

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## 1. Introduction

The biogeography of the Greater and Lesser Antilles herpetofauna has been the subject of several publications during the past decades (Hedges, 1996, 2006; Lescure, 1987; Lescure et al., 1991). Thus, the present-day composition and distribution of the herpetofauna on the Caribbean Islands is well known (Henderson and Powell, 2009; Powell and Henderson, 2012). In the same way, the modern herpetofauna on the Guadeloupe Islands is well documented and has recently been the subject of a monograph (Breuil, 2002). In contrast, the fossil and subfossil herpetofauna is poorly known, in particular in the Lesser Antilles (Pregill and Olson, 1981; Pregill et al., 1988, 1994). Many questions remain unresolved as regards the past Guadeloupean herpetofaunal community and in spite of several studies focusing on archaeological fauna (Grouard, 2001, 2003, 2007, 2010), pre-anthropogenic fossil data for reptiles and amphibians have remained scant since the pioneering work of Pregill et al. (1994). In addition, the impact of human populations on herpetological communities during Amerindian and colonial periods is sparsely documented although some works have attempted to tackle this question (Pregill, 1986; Steadman et al., 1984).

The recent exploration and excavation of fossil-bearing deposits in Guadeloupe and Marie-Galante considerably improve our knowledge of past Guadeloupean biodiversity (Grouard et al., 2014; Lenoble et al., 2009; Stouvenot et al., 2014). The present study focuses on reptile and amphibian remains collected from one of these sites, the Cadet 2 Cave, which lies on the southeastern coast of Marie-Galante, and documents the composition and evolution of the Marie-Galante herpetofauna over the past thirty thousand years.

### Marie-Galante island and site description

Marie-Galante (61.223358 W; 15.893134 N) (Fig. 1) is a small, low-lying limestone island of approximately 158 km<sup>2</sup> (maximum altitude = 202 m). It probably emerged during the Late Calabrian about 800,000 years ago (Münch et al., 2013). Six squamate species occur nowadays on the island: three of them are considered to be native species (*Anolis ferreus*, *Sphaerodactylus fantasticus anidrotus* and *Thecadactylus rapicauda*) and three others as recently introduced species (*Iguana iguana*, *Gymnophthalmus underwoodi* and *Hemidactylus mabouia*). There are also three species of frogs, one native (*Eleutherodactylus martinicensis*) and two allochthonous (*Eleutherodactylus johnstonei* and *Scinax cf. x-signatus*). Several other currently extinct taxa have been mentioned by naturalists over the past centuries, including three squamates, the scincid *Capitulum mariagalantae* and two snakes (*Alsophis antillensis* and

*Liophis juliae*) (Breuil, 2002). In addition, the genus *Iguana* have been mentioned in Marie-Galante archaeological deposits dated from 200 to 1000 AD (Grouard, 2001). The Cadet 3 fossil deposit (Sierpe, 2011; Stouvenot et al., 2014) containing layers dated from 13,800 BC to modern time provides evidence of three additional extinct taxa, hitherto never mentioned on the island (*Boa* sp., *Ameiva* sp. and *Leiocephalus cuneus*). *Ameiva* was previously thought to have been present on Marie-Galante during the past by Breuil (2002), but clear evidence was lacking.

Cadet 2 is a flank margin cave (Lenoble et al., 2009) opening onto the cliff of the Capesterre terrace near the Cadet 3 site, about 250 m from the coast (Fig. 1). The site was first excavated by P. Courtaud from 2004 to 2007 in order to record Amerindian burials (Courtaud, 2011; Courtaud et al., 2005). Due to the paleontological potential of the site (Lenoble et al., 2009) another excavation was subsequently directed by S. Grouard in 2010 to investigate the pre-anthropogenic layers and to collect the vertebrate remains. This last excavation focused on two loci described below.

The first locus (Fig. 1) is located in the deepest part of the cave. It measures one square meter and reaches a depth of 1.4 meters. This locus contains a large part of the cave infilling. Above a basal accumulation of sands rich in seashells and land crab fragments (U5-D), the deposits correspond to a succession of bedded silt, divided into three subunits following the sedimentary structure (U5-C to U5-A). The organic silt fraction was radiocarbon dated at the *Centre de datation par le radiocarbone*, Lyon, (France). The dates range between 34,229–31,888 cal. B.C. and 11,909–11,530 cal. B.C. (Ref.: Ly 8496–8492) (Fig. 1). Above these levels, lies layer U4–U4', corresponding to an undated non-excavated archaeological level, probably of Holocene age. An archaeological pit was identified in layer U4 (ST 500 see Fig. 1). This structure is contemporaneous with the Amerindian occupation of the cavity, estimated to date from the 14th century AD (Courtaud, 2011; Courtaud et al., 2005).

The second locus was excavated over half a square meter and divided into six levels. The radiocarbon dating of a charcoal from level U5-b at the Erlangen laboratory (Germany) yielded ages of 28,413–27,425 cal. B.C. (Ref.: Erl 14,011). On the basis of the characteristics of the sediment facies, the stratigraphic units of this locus were correlated with layers U5-C and U5-B from the first locus, and are thus considered to be of Pleistocene age.

The whole assemblage is made up of 131,571 osteological remains, including 57,468 (48%) reptile and amphibian remains collected in all the layers except U5-D, which contained only few very fragmented bones.

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