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Corentin Bochaton

► To cite this version:

Corentin Bochaton. First records of modified snake bones in the Pre-Columbian archaeological record of the Lesser Antilles: Cultural and paleoecological implications. *Journal of Island and Coastal Archaeology*, 2020, pp.1-16. 10.1080/15564894.2020.1749195 . hal-02981643

HAL Id: hal-02981643

<https://hal.science/hal-02981643>

Submitted on 28 Oct 2020

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1 **First records of modified snake bones in the Pre-Columbian archaeological**
2 **record of the Lesser Antilles: cultural and paleoecological implications**

3 Corentin BOCHATON^{a, b}

4 *^aMax Planck Institute for the Science of Human History – Department of Archaeology.*

5 *Kahlaische Straße 10, 07745 Jena, Germany.*

6 *^bPACEA – UMR CNRS 5199 – Université de Bordeaux – Ministère de la Culture et de la*

7 *Communication, Avenue Geoffroy St Hilaire, CS 50 023, 33 615 Pessac cedex, France.*

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The past distribution of *Boa* snakes and their interactions with Pre-Columbian human populations in the Lesser Antilles (Caribbean) remain enigmatic. These snakes currently have a patchy distribution in the islands and are nearly absent from archaeological deposits. This raises questions about whether their absence from Pre-Columbian contexts should be interpreted from a biological or a cultural point of view. In this study, I provide three new references to *Boa* remains from archaeological and natural deposits on the islands of Guadeloupe and Martinique, most of which were manufactured into beads. These are the first objects in the Lesser Antilles known to be manufactured using snake bones and all appear to be made from *Boa*, despite a wider diversity of snakes occurring in this region. Using these new observations and combined pieces of evidence from archaeological, historical, and biological data sources, I propose that the extreme scarcity of *Boa* in zooarchaeological assemblages reflects their prominent status in Pre-Columbian Amerindian communities.

Keywords: modified bone, Martinique, squamate, zooarchaeology, Guadeloupe.

Introduction

In zooarchaeological studies, the absence of a species from an archaeological assemblage can be explained by past species distributions, taphonomic factors, or lack of interaction with human communities. As a result, it is necessary to assess archaeological evidence alongside additional sources of data to adequately explain a species' absence from the archaeological record. Clues may surface through comparison with additional archaeological bone assemblages, but may also come from historical and biological (e.g., biogeography, paleontology, modern distribution, etc.) data sources, when available, for the studied periods, areas, and taxa. Such a multidisciplinary approach allows for the study of both past human behaviors toward animals and changes in animal diversity and distribution through time, two topics that are still generally understudied in tropical areas, despite their critical scientific importance in understanding the current mass extinction crisis (Barnosky et al., 2017; Ceballos et al., 2017). Though islands have certainly garnered attention in this regard (Nogu et al., 2017; Steadman, 2006), including those in the Caribbean (e.g., Brace et al., 2015; Cooke et al., 2017; Steadman et al., 2015; Stoetzel et al. 2016), most studies have focused only on mammals. Among the less investigated taxa are terrestrial reptiles, which remain poorly known at a regional scale (but see

Bochaton et al., 2016a; Etheridge, 1964; Pregill et al. 1994). Of indigenous reptiles, *Boa* Linnaeus, 1758 and other snakes are among the most poorly documented given that they are only known from a few islands (see background section). As such, their diversity and degree of interaction with past human populations remains enigmatic.

In this paper I describe several archaeological objects, probably beads, made of *Boa* snake vertebrae discovered on two islands in the Lesser Antilles: Basse-Terre (Guadeloupe) and Martinique. I also present a new record of *Boa* from a natural deposit on La Désirade Island (Guadeloupe). These finds provide a means for discussing the nature of interactions between Pre-Columbian Amerindians and *Boa* snakes, the reason for their extreme scarcity in prehistoric archaeological deposits, and add to the list of animals that native groups in the Caribbean used for ornamentation.

Background section

The Lesser Antilles

The Lesser Antilles is a chain of medium to very small islands (less than 1000 km²) situated in the Atlantic Ocean between South America and the Greater Antilles (Figure 1A). The archaeological record of the Lesser Antilles is known to varying degrees from island to island, with some islands having been intensively investigated (Keegan et al., 2013). Existing archaeological data document the earliest human colonization of this region between 7000 and 5500 cal. BP by aceramic (Archaic) Amerindian groups (Fitzpatrick, 2015; Napolitano et al. 2019; Siegel et al., 2015). The first populations producing ceramics arrived around 2500 cal. BP and formed the Saladoid cultural assemblage. A second cultural assemblage called Troumassoid evolved from the Saladoid and gradually replaced it around 1500 cal. BP. This last culture survived until the arrival of Europeans in the Lesser Antilles in 1493 and the emergence of a new ceramic style called Cayo. Amerindians were nearly eradicated from the Lesser Antilles in the 17th century during European colonization. These different periods of occupation are represented at numerous archaeological sites in the Lesser Antilles, which have yielded many different kinds of faunal assemblages (e.g., Newsom and Wing, 2004).

These zooarchaeological assemblages document the subsistence strategies of past human populations but also, to a certain extent, past species distributions. These data are of special interest in the Lesser Antilles, a region whose terrestrial biodiversity was impacted by a massive extinction crisis starting in the 17th century. This crisis affected several taxa, including terrestrial and flying mammals (Cooke et al., 2017), birds (e.g., Gala and Lenoble, 2015; Olson, 1978), and squamates (e.g., Bochaton et al., 2015; Pregill et al., 1994). Zooarchaeological assemblages also indicate environmental disturbances related to Pre-Columbian populations and their introduction of exogenous taxa to the islands (Bochaton et al., 2016b; Giovas, 2017).

Snakes in the Lesser Antillean archaeological record

Snake remains are recorded in around half of the zooarchaeological studies of Lesser Antillean Amerindian deposits. These taxa are, however, are often represented by very few remains (e.g., Bochaton et al., 2019; Giovas, 2016; Healy et al., 2003; Newsom and Wing, 2004; Reitz, 1994), do not indicate consumption by Amerindians and thus appear to reveal little about past economy and subsistence (Bochaton et al., 2019). In addition, the lack of comparative collections has hampered taxonomic identification, such that snake remains discovered in archaeological contexts are rarely identified beyond the family level (Colubridae *sensu lato*). Some authors nevertheless have attributed snake remains to the genus *Alsophis* Fitzinger, 1843 (Carder et al., 2007; Crock and Carder, 2011; Wing et al., 1968) which is, along with the genus *Erythrolamprus* Wagler, 1830, one of the two genera of colubrid snakes occurring in the Lesser Antilles. Some of the rare species-level identifications come from Saint-Martin, where the endemic species *Alsophis rijgersmaei* Cope, 1869 was recorded (Newsom and Wing, 2004), and from Guadeloupe, where two species of *Alsophis* (*Alsophis antillensis* (Schlegel, 1837) and *Alsophis* sp. 2) and one species of *Erythrolamprus* (*Erythrolamprus juliae* cf. *copeae* (Parker, 1936) were recorded (Bochaton et al., 2019). Much work is still needed to better understand the diversity of colubrid snakes in the archaeological record of the Lesser Antilles, but the data concerning other snake families and especially boid snakes are even scarcer. Indeed, the rare traces of their past occurrences have only been found on Marie-Galante, where an endemic species was present at least during the Pleistocene (*Boa blanchardensis*, Bochaton & Bailon, 2018), and

Antigua where putative *Boa constrictor* remains were discovered in two Holocene deposits (Pregill et al., 1988). *Boa* snakes currently occur on two islands in the Lesser Antilles, St. Lucia and Dominica, where they are represented by two endemic species, *Boa orophias* Linnaeus, 1758 and *Boa nebulosa* (Lazell, 1964) (see Henderson and Powell, 2009). Additionally, there are historical sources describing possible *Boa* snakes on Martinique (Labat, 1724) and possibly St. Vincent (Moreau de Jonnès, 1816), but these records were never supported by historical specimens or fossil evidence.

The past distribution of Boa snakes in the Lesser Antilles

Modern, historical and fossil records provide a patchwork view of the past distribution of *Boa* snakes in the Lesser Antilles (see Table. 1). However, since *Boa* snakes colonized the Lesser Antilles from South America and reached at least as far north as Antigua, they likely colonized most, if not all, of the islands between Tobago and Antigua. Indeed, most Lesser Antillean squamates of South American origin colonized the different islands using rafts of floating vegetation, which lead to their progressive dispersal from the southern islands to the northern islands following marine currents (Calsbeek and Smith, 2003; Hedges, 2006; Lescure, 1987). The most likely hypothesis is thus that the current patchy distribution of *Boa* in the Lesser Antilles reflects numerous relatively recent extirpation or extinction events. Following this hypothesis, we would expect to recover *Boa* remains in Pre-Columbian Lesser Antillean archaeological deposits. This is, however, not the case, and *Boa* snakes were never identified in any Lesser Antillean archaeological deposits with the exception of a putative occurrence (cf. *Boa constrictor*) at the Indian Creek site in Antigua (Steadman et al., 1984a). This absence is very difficult to understand because we currently do not know if *Boa* snakes were present on the different islands during Pre-Columbian periods or if they were only absent from coastal areas where most of the archaeological deposits are situated. There is also a possibility that they were avoided by Amerindians and thus absent in archaeological deposits.

Materials and Methods

Archaeological

The archaeological/subfossil material of *Boa* investigated in this study corresponds to vertebrae collected on Martinique and Guadeloupe (French West Indies). Seven of these remains were collected from the site of Dizac Beach on Martinique, one is from the site of Basse-Terre Cathedral on Guadeloupe Basse-Terre Island, and one was discovered at the site of Pointe-Gros Rempart 6 on La Désirade Island.

The archaeological open-air site of Dizac Beach is located on the southern coast of la Martinique (Figure 1C) on the Dizac Beach (14° 28'29.276" N, 61° 2'18.016" W, WGS84). This site was the object of several excavations, the last one conducted by N. Vidal between 1989 and 1992 (Vidal, 1991, 1998, 2003). These last excavations reveal that the site was a culturally homogenous middle/late Cedrosan Saladoid settlement (Berthé and Bérard, 2013). The four ¹⁴C dates obtained on queen conch (*Eustrombus gigas*) shells indicate an occupation period between cal. AD 415 and 690 (ARC-999, ARC-1016, ARC-1017, and ARC-1018, see Vidal, 2003). The zooarchaeological material of this site was previously studied by Grouard (Grouard and Bérard, 2005), but the *Boa* remains presented here were not previously identified. *Boa* remains in this assemblage were discovered in 2017 during a re-analysis of the faunal material. The seven recovered vertebrae were recovered from squares I4, J4, and J5 at depths between 208 and 234 cm in the undisturbed Cedrosan Saladoid layer.

The archaeological site of Basse-Terre Cathedral (BTC) (15° 59'43.191" N, 61° 43'47.662" W, WGS84) is located in downtown Basse-Terre on Basse-Terre Island (Guadeloupe) (Figure 1B). It is an open-air deposit corresponding to a colonial cemetery and earlier Huecan/Cedrosan Saladoid Amerindian settlement. This site was first assessed by T. Romon in 2001 (Romon, 2001) and extensively excavated by D. Bonnissent in 2002 (Bonnissent and Romon, 2004). The site yielded several Pre-Columbian layers, dated to the Early Saladoid, which contained a rich assemblage of vertebrate and invertebrate faunal remains previously investigated by Grouard (2007). As at Dizac, *Boa* remains were not previously identified. The newly identified *Boa* vertebra fragment recovered from this site was recovered from the Cedrosan Saladoid stratigraphic unit 1086.

The site of Pointe Gros Rempart 6 (PGR6) (16° 19' 41.56"N, 61° 0' 49.18"W, WGS84) is a pit cave deposit located near the southern coast of La Désirade Island (Guadeloupe) (Figure 1B). This

site was first excavated by M. Boudadi-Maligne in 2011 (Boudadi-Maligne et al., 2016) and was the object of a second excavation in 2016 by A. Lenoble. Unlike the two previous sites, PGR6 is not an archaeological deposit. The accumulation was mostly formed by biotic activity, which led to the inclusion of some artifacts that likely fell into the cavity from an archaeological deposit located above. The sedimentary infilling of PGR6 consists of four layers dated to the Pre-Columbian ceramic periods (Layers 4 and 3), to the Colonial period (Layer 2), which on la Désirade starts with permanent French settlement in AD 1728 and extends to modern times (Layer 1). A ceramic sherd recovered in a Pre-Columbian layer is not diagnostic enough to derive a precise estimate of the age of the basal part of the deposit. Nonetheless, a radiocarbon date of 1443–1651 cal BP (1960±30 BP, Beta-407191; Boudadi-Maligne et al., 2016) obtained from Layer 3 indicates that the final part of the Pre-Columbian period is represented at the site. The faunal material recovered during the first excavation of this site was recently studied and contains many remains of several squamate taxa, but no *Boa* remains (Boudadi-Maligne et al., 2016). The *Boa* vertebra presented here was recovered from layer 4 during the second excavation of the site.

Study methodology

The full faunal assemblage of each reported deposit was investigated to search for *Boa* remains. Investigated remains were analyzed using a binocular microscope NIKON SMZ 445 to observe their surface condition. Taxonomic identification of the remains was performed using the published anatomical criteria of the Boidae family (Hsiou and Albino, 2009; Rage, 2001; Szyndlar and Rage, 2003), the *Boa* genus (Albino, 2011, 2012), and the Lesser Antillean *Boa* species (Bochaton and Bailon, 2018). The nomenclature used to describe the anatomical structure of the vertebrae follows Hoffstetter and Gasc (1969) and Szyndlar (1984).

Results

Taxonomic identification and morphology of the remains

The investigated vertebrae have been attributed to an undetermined species of the genus *Boa*, as they conform to several osteological criteria of Boine snake vertebrae: they are strongly built, short and wide, with a non-depressed neural arch that has a strongly notched posterior margin, a thick zygosphen, low inclination of the articular facet of the prezygapophyses, a vertebral centrum shorter than neural arch width, and well defined precondylar constriction (Albino, 2011; Hsiou and Albino, 2009; Rage, 2001; Szyndlar and Rage, 2003). Investigated vertebrae also feature small paracotylar foramina and present a zygosphen wider than the cotyle, which are characteristics of the genus *Boa* (Albino, 2011, 2012). A specific attribution of investigated specimens is out of reach due to poor preservation of other diagnostic features. The anterior margin of the zygosphen is straight in all vertebrae, but this condition cannot be assessed on the vertebra from La Désirade. This feature is characteristic of continental *Boa constrictor*, and *Boa nebulosa* from Dominica, but is absent in the fossil *Boa blanchardensis* described on Marie-Galante (Bochaton and Bailon, 2018). The vertebra from La Désirade presents a relatively low neural spine similar to those observed in *B. nebulosa* and *B. blanchardensis*, but not in continental *B. constrictor* (Figure 2).

Regarding the sizes of the investigated vertebrae, the bone from La Désirade was the only one well-preserved enough to derive a measurement of its centrum length (5.48 mm), and thus estimate the total length of the complete individual at around 1.35 m. This bone, however, is too fragmented to be included in a morphometric analysis, as are all the other vertebrae investigated. The vertebrae collected on the Dizac Beach site, though impossible to measure accurately, all seem to be of similar size, indicating they could all correspond to a single individual. This individual is roughly estimated at 180 cm in total length based on the overall size of the vertebrae. The single vertebra from Basse-Terre is likely to have been part of an individual around 150 cm in total length, but a precise estimation is also impossible. The sizes of the investigated *Boa* individuals (below 180 cm of total length) fall within the size range of *Boa nebulosa*, which currently occurs on Dominica.

Surface alterations

Among the investigated vertebrae, the specimens collected in Basse-Terre and Martinique archaeological deposits present alteration marks suggesting the remains were worked. Such traces were absent on the vertebra collected at PGR6 (Figure 2).

The bone from Basse-Terre Cathedral is a well-preserved vertebral neural arch presenting asymmetric and irregular fracture planes, which indicates the vertebra was probably unintentionally broken (Figure 3A). The bone likely was, however, intentionally polished, as indicated by the perfect flatness of its dorsal and lateral margins. Dorsally, the polishing has erased the neural spine and the posterodorsal part of the roof of the neural arch, which makes the zygosphenic facets visible in dorsal view. Abrasions on the left and right lateral sides are asymmetrical. On the left side, a small part of the posteromedial area of the prezygapophyseal facet is still visible, but the lateral area of the neural arch has been erased. On the right side, the abrasion seems to have been a little stronger, but the anterolateral part of the fragment is broken. These abrasions give the neural arch a sub-circular shape in anterior view. An ochre color residue of unknown nature is present on the preserved parts of the prezygapophyseal, zygantrum, and zygosphenic facets. This well-marked residue is exclusively localized in the above-mentioned articulation areas, which could indicate sustained contact with other vertebrae throughout the deposition process. Indeed, if this ochre deposit was originally present on the whole vertebra, there is a possibility that it could have been protected from contact with soils on contact areas between several vertebrae. It is possible that the ventral part of the Basse-Terre object was also polished, as observed on the Dizac specimens (see below), but this part of the vertebra was not preserved. I propose a reconstruction of what could have been the shape of the complete object (Figure 3B).

The seven vertebrae from Dizac Beach are poorly preserved and were subject to much dissolution, probably because of the acidic nature of Martinique's volcanic sediment (Figure 3C). As a result, their surface is strongly altered and the vertebrae are partly broken, despite being mostly complete. Such dissolution alterations could also correspond to digestion activity; however, the occurrence of strictly flat polished areas on all the remains is not consistent with digestion processes. Indeed, Dizac vertebrae present, to a variable extent, polished surfaces similar to the specimen from

Basse-Terre, yet these vertebrae seem to have been the object of less work than the fragment from the BTC site. Indeed, polished surfaces are only present on the dorsal and/or ventral surfaces of these vertebrae and seem absent from the other parts of the bone. It is unclear, however, whether the lateral sides of all the vertebrae were altered considering their poor level of preservation. Six of the seven vertebrae were polished on their dorsal part, which erased their neural spine and sometimes the posterodorsal part of the neural arch. Ventral abrasion was unambiguously observed on two specimens, but impossible to assess on five of the vertebrae. Such abrasion erased the hemal keel as well as the anterior part of the condyle, which gives the centrum a flat ventral margin (Figure 3C, 3D).

This intentional shaping of the vertebrae to give them a more circular or quadrangular shape could indicate that these remains were used as beads and that people took advantage of the natural shape of the objects to string them together. A string could indeed be inserted in the neural canal, making it unnecessary to perforate the bones. This kind of object has not previously been described in any Antillean Pre-Columbian archaeological context. However, the historical chronicler J.-B. Du Tertre (1654, p. 356) testifies that Amerindians “boiled [snakes] so they could retrieve their vertebrae to make nice cordons” (personal translation from French). As such, it seems unsurprising that archaeological snake vertebrae may have been worked into beads, and in fact, beads made from other materials (bone, shell and stone) were also observed at the BTC site (Bonnissent and Romon, unpublished data).

Discussion

These three occurrences of *Boa* are the first reported identifications of the genus on the islands of Martinique, Basse-Terre, and La Désirade. On Martinique, the past presence of a now-extinct *Boa* was strongly suspected considering historical mentions of the snake on the island (Labat, 1724), but direct evidence of this was lacking until now. The situation on Guadeloupe’s islands is more complex considering that *Boa* snakes were never mentioned by chroniclers who described the 17th century fauna of these islands (Du Tertre, 1654; de Rochefort, 1658) (see Table. 1). This taxon was also never recorded in the numerous zooarchaeological assemblages of Guadeloupe (Grouard, 2001, 2007). A

fossil *Boa* did occur on Marie-Galante Island, but was restricted to the Pleistocene period and never identified in any Holocene natural or archaeological assemblages (Bochaton and Bailon, 2018). The vertebrae recently collected at PGR6 on La Désirade and at BTC on Basse-Terre are thus the first Holocene record of *Boa* on Guadeloupe.

A prerequisite to any archaeological interpretation of these newly discovered *Boa* bones is to discuss their origins. Indeed, as far as rare taxa and manufactured bones are concerned, the possibility of human introduction of exogenous non-living animals or animal parts must to be considered (Giovas, 2017; Laffoon et al., 2014). The vertebra collected at PGR6 was part of an assemblage accumulated by a nocturnal raptor, probably a medium-sized owl. It is thus very likely that the *Boa* individual recovered at this site was caught on La Désirade. Indeed, the nearest island currently inhabited by *Boa* (Dominica) is 90 km away from La Désirade, which is inconsistent with the usual hunting range of owls (e.g., within 5 km of its nest for the Barn owl; Taylor 2004). However, the origin of the worked vertebrae recovered on the Basse-Terre and Martinique cannot be demonstrated. This is not a major issue for Martinique since the past occurrence of *Boa* on this island is supported by historical descriptions (see Table. 1). However, assessing the potential past occurrence of *Boa* snakes on Basse-Terre Island requires attention to biogeographic data.

The genus *Boa* is a South-American taxon that colonized at least part of the Lesser Antillean islands from south to north following the direction of ocean currents (Hedges, 2006). This colonization was probably prior to the Late Pleistocene since *Boa* occurred during this period on Marie-Galante and given the morphological divergences between Lesser Antillean and continental species (Bochaton and Bailon, 2018). At that time, La Désirade, Grande-Terre, and Basse-Terre islands formed a single island. Consequently, if *Boa* snakes occurred on la Désirade during the Holocene, they were likely also present on the other islands, at least during the Late Pleistocene. The Late Holocene occurrence of *Boa* on Antigua north of Guadeloupe is an additional argument that these snakes traveled across Guadeloupe's islands in the past (see Table. 1). These lines of evidence support the Pre-Columbian occurrence of *Boa* on Basse-Terre Island. If we accept the past occurrences of *Boa* snakes on Martinique, Guadeloupe, as well as on other Lesser Antillean islands south of Antigua, then past

distribution can no longer be an explanation for their near absence in Pre-Columbian archaeological assemblages.

The data presented here suggest that in addition to being very rare in archaeological deposits, *Boa* vertebrae were manufactured into beads. This treatment seems specific to *Boa* snakes as such bone modifications have never been reported on the more numerous colubrid snake vertebrae recovered from deposits in the region (e.g., Bochaton et al., 2019). Does this mean *Boa* snakes had special meaning for Lesser Antillean Pre-Columbian Saladoid populations? Snakes feature prominently in the beliefs of many cultures around the world (Hasting, 1920), but in the absence of historical sources, it is extremely difficult to infer symbolic behaviors of Pre-Columbian populations. However, by combining Cedrosan Saladoid archaeological evidence with historical records describing the behaviors of the last Amerindians in the Lesser Antilles, it is possible to formulate some hypotheses regarding the status of *Boa* snakes in these communities. First, considering that *Boa* snakes are mostly absent from archaeological contexts, it is reasonable to extrapolate that they were probably not hunted or killed by Amerindians in the vicinity of their settlements. Indeed, in contrast to *Boa*, small and large colubrid snakes are often represented in archaeological assemblages (Bochaton et al., 2019). Second, considering there is no evidence for the consumption of snakes by Amerindians, the occurrence of snake vertebrae in Guadeloupe deposits was interpreted as evidence of synanthropic behavior of snakes looking for food near human settlements. The absence of evidence of snake consumption by Saladoid and Troumassoid Amerindians is supported by the testimony of a 16th century chronicler. The Carpentras anonymous chronicle mentions that “[t]here are a lot of eels that they (Amerindians) named “marssy”, but they never eat them saying in their language that they are sisters of snakes” (Grunberg, 2013 p. 18; personal translation from French). This mention implies that Taínos did not consume snakes. The same author also reports that “[...] our Indians who see them (*Boa* snakes) say that, if they kill them, the harm they will do to them will be done to their grandchildren, and they (Amerindians) made us (Europeans) kill them, because they said we had no grandchildren” (Grunberg, 2013 p. 21; personal translation from French). Taíno Amerindians seem to have had a reluctance to kill *Boa* snakes and this animal was also the object of beliefs. Indeed, Charles

de Rochefort (1658) tells a story about a large snake from Dominica (certainly *Boa*): “The numerous Caribs inhabiting this Island (Dominica) have long told those visiting this island a tale about a large and monstrous snake that had its den in a cave. They said it carries on its head a shining stone like a dark red garnet of inestimable worth. The snake usually hides its rich ornament with a small moving skin similar to the eyelid but when it goes to drink or when it moves in its deep abyss it shows its stone and all around is brightened by a wonderful fire glow emanating from this precious crown” (de Rochefort, 1658 p.21; personal translation from French). These mentions suggest that *Boa* snakes had, among all snakes, a special status and were especially feared and respected, which could explain their scarcity in archaeological deposits.

The identification of *Boa* snakes in Lesser Antillean archaeological deposits also raises a concern about the lack of snake remains identified at the genus and species level in this region (see background section). In that regard, it is interesting to note that the only records of *Boa* snakes in archaeological contexts originate from the few assemblages partly studied by trained paleoherpetologists (this study, and G. K. Pregill in Antigua). The issue of the lack of archaeological mentions of *Boa* in the Lesser Antilles, as well as for other squamate taxa (e.g., *Diploglossus* see Bochaton et al., 2016a), can thus also be related to the small attention paid to rare taxa, which are often difficult to identify and of minor zooarchaeological interest. It is difficult for a single specialist to be an expert in each of the broad diversity of taxa occurring in zooarchaeological assemblages, especially in tropical regions. Collaboration between several trained specialists on a single assemblage (e.g., Pregill et al., 1988; Steadman et al., 1984b; Watters et al., 1984), would probably improve the precision of zooarchaeological data. Such collaborative investment may seem costly since rare taxa are of minor interest for the study of subsistence, but these should not be neglected considering their potential to address cultural and biological questions, as is the case in this work. These new data concerning *Boa* snakes also raise questions about the use of archaeological data to reconstruct past biogeography by showing that the absence of taxa in archaeological deposits is not evidence of their absence in the surrounding environment. The investigation of a combination of different types of deposits formed by different accumulation processes can help to clarify this issue. Indeed, the

comparison of different types of deposits (e.g., natural and archaeological) can be immensely helpful to sort out whether the absence of a taxon can be considered significant or related to a specific cultural or natural bias.

This investigation demonstrates how different lines of evidence—archaeological, historical and biological—can be used to propose an interpretation of the absence or extreme scarcity of a taxon in zooarchaeological assemblages. Using several data sources, this work sheds light on the putative status of *Boa* snakes for Pre-Columbian Lesser Antillean Amerindians, which could explain their scarcity in deposits and use in the production of beads. These new occurrences also demonstrate the past occurrence of *Boa* snakes on several islands on which they no longer occur today. The timing of the extinction of these snakes remains largely unknown and additional samples from well-dated contexts are needed to investigate whether or not they fit within the general model of squamate extinctions related to modern anthropogenic impact. From a more general zooarchaeological point of view, few data document the history of interactions between snakes and humans despite these animals playing an important role in the belief systems of numerous societies around the world (Morris and Moris, 1965; Mundkur, 1983).

Acknowledgment

The author is grateful to the Service Régional de l'Archéologie of Martinique (Damien Leroy and Thierry Dorival) and Guadeloupe (Dominique Bonnissent) who enabled access and loaned the material for this study. I also thank Salvador Bailon for his assistance and advice in the earliest phase of this work, Jean Lescure for the numerous discussions we had and for his bibliographic advice, Sandrine Grouard for granting access to the archaeological material of the Cathédrale de Basse-Terre site loaned by the Service Régional de l'Archéologie de Guadeloupe, and A. Lenoble for providing the material recently excavated at the PGR6 site. I am also grateful to the three reviewers who provided many useful comments which helped me to improve the quality of this paper and to the editors of JICA who proofread it and revised the English.

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354 The author was funded by a fellowship granted by the FYSSSEN foundation and also received support
355 from the Société des Amis du Muséum National d'Histoire Naturelle. The fieldwork during which the
356 Martinique zooarchaeological material was investigated was funded by the Direction des Affaires
357 Culturelles de Martinique and the FEDER program 2016–2020 “Ecosystème insulaire tropical,
358 réponse de la faune vertebrae terrestre à 6 000 ans d’anthropisation de la Guadeloupe” (ECSIT),
359 operated by the CNRS and funded by a European PO-FEDER 2014-2020 grant (grant n°2016-FED-
360 503), the Guadeloupe Regional Council, and the DAC of Guadeloupe.

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Table 1: Summary of the fossil, archaeological, historical, and modern occurrence data of the genus *Boa* in the Lesser Antilles (islands between Trinidad and Barbuda) with the two new occurrence data added by the present study.

550 Figure 1: Location of the deposits from which *Boa* remains were recovered. A) Map of the Lesser-
551 Antilles, B) Map of Guadeloupe islands, C) Map of Martinique Island. List of sites: **1**: Site of Basse-
552 Terre Cathedral; **2**: Site of Pointe Gros Rempart 6; **3**: Site of Dizac Beach.

553
554 Figure 2: The *Boa* vertebra recovered from the site of Pointe Gros Rempart 6. **Abbreviations:** **ct.:**
555 cotyle; **cd.:** condyle; **h. k.:** hemal keel; **i. c.:** interzygapophyseal constriction; **n. s.:** neural spine; **p. f.:**
556 paracotylar foramen; **pr. f.:** prezygapophyseal facet; **ps. f.:** postzygapophyseal facet; **zs.:** zygosphenes;
557 **zt.:** zygantrum.

Figure 3: A) The *Boa* vertebra fragment recovered in the US 1086 of the Basse-Terre Cathedral site. Black arrows indicate the occurrence area of the ochre color deposit. C) One of the seven *Boa* vertebrae recovered in the site of Dizac Beach on Martinique. Shaded parts indicate the polishing areas. B, D) Hypothetic reconstruction of what the complete objects may have looked like and which

563 parts of the original vertebra were preserved after it was manufactured (B – the vertebra from Basse-
564 Terre, C- the vertebra from Martinique). Not preserved parts are indicated in dash lines to represent
565 the hypothetic shape of the full objects. Abbreviations: **h. k.:** hemal keel; **n. c.:** neural canal; **n. s.:**
566 neural spine; **pr. z.:** prezygapophysis; **ps. z.:** postzygapophysis; **zs.:** zygosphenes; **zs. f.:** zygosphenes
567 articular facet; **zt.:** zygantrum; **zt. f.:** zygantrum articular facet.