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Birdmen, *cemís* and *duhos*: material studies and AMS ^{14}C dating of Pre-Hispanic Caribbean wood sculptures in the British Museum

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ABSTRACT

This paper presents 19 AMS radiocarbon dates from nine pre-Hispanic Caribbean (Taíno/Lucayan) wooden sculptures in the British Museum collections, provenanced to Jamaica, Hispaniola and the Bahamas. Together with strontium isotope results and wood and resin identifications, these data build a material and chronological context for some of the most recognised examples of Taíno art – from *duhos* (ceremonial seats) and *cemís* (free standing depictions of deities, ancestors and spirits) to canopied stands used to hold hallucinogenic drugs during the *cohoba* ceremony. Each sculpture widens our understanding of Caribbean carving traditions, stylistic variation, chronologies and material resource utilisation. A group of three sculptures recovered from Carpenters Mountains, Jamaica, carved by AD 1300 and brought together as a ceremonial 'set', each appear to have had their inlays renewed over a century later, suggesting long-term use. Three key examples of the main Caribbean duho categories (high-back, low-back and extended), provide insights into the diversity of styles present in the region post-AD 1100. The British Museum's corpus enables an exploration of regional styles, and potentially the work of individual artists.

1. Taíno/Lucayan sculpture in the British Museum collections: corpus and context

The British Museum (BM) collection holds some of the most celebrated pre-Hispanic wood sculptures from the Caribbean region, with the earliest documented examples being acquired by the 18th century (Table 1). Some were presented as diplomatic gifts to British dignitaries, others were fortuitous chance finds recovered from caves; many have featured prominently in exhibitions and catalogues (most recently, Oliver et al. 2008; Brecht et al., 1997; Kerchache, 1994a). Where documentation survives, it recounts a fascinating history of discovery and acquisition, but it is the physical, 'embodied' history of each carving – from choice of wood and other materials to the imprint of adze cuts – that has been the focus of recent research. Between 2005 and 2010, the sculptures underwent detailed study, including sampling for AMS ^{14}C dating, strontium isotope analyses and material identifications (wood and resin), alongside 3-D laser scanning (Fig. 1) and a full photographic inventory of visible cuts and polish traces (e.g., Fig. 2). This paper focuses on the radiocarbon and strontium isotope results in order to better situate the carvings in time and place and to explore their original significance to the people who made them. The results from these nine carvings, together with the data from the 56 artefacts reported earlier in this journal (Ostapkowicz et al. 2012a), complete the dating overview for the *Pre-Hispanic Caribbean Sculptural Arts in Wood* project. Detailed reports that chart individual artefact histories are in preparation.

At the time of European expansion into the New World, the Taíno and Lucayans were the indigenous peoples of the Greater Antilles and the Bahamas and Turks and Caicos Islands, respectively – the former subsuming great cultural and linguistic diversity. They relied heavily on wood for everything from canoes and house supports to elaborately carved elite accoutrements, such as *duhos* (ceremonial seats, usually in the form of an anthropo/zoomorphic creature on all fours, its 'tail' sometimes extending into a high back) and large-scale *cohoba* paraphernalia, used in the eponymous drug ceremony that facilitated communication with the numinous. Sculptural *cemís* – depictions of spirits, ancestors and deities – took

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Table 1
Collection histories of the nine British Museum Taíno/Lucayan pieces, from the earliest acquisition in 1757. The bracketed numbers immediately after the descriptive title cross-reference to the numbers used in Table 2, which lists them by provenance in chronological order based on their AMS radiocarbon dates.

Carving, acc no.	Year collected	Year acc.	Provenance	Collection history	Donor(s)
Anthropomorphic cemí [5] Am1997, Q.793	Pre-1757	1757	Jamaica	Book of donations, 20 May 1757, no. 2108: 'A wooden image brought from Jamaica and supposed to be an American idol: presented by James Theobald, Esq. (some years ago given to me by a gentleman who has a considerable estate on the island of Jamaica, in searching a deep cave in the hills for runaway slaves found two of these figures at inner end)'	James Theobald
Canopied/cohoba stand [6] Am1977, Q.1 Anthropomorphic cemí, [7] Am1977, Q.3 Zoomorphic cemí [8] Am1977, Q.2	1792	Pre-1840?	Cave near the summit of 'Spots', Carpenters Mountains, Jamaica	Society of Antiquaries of London, Minute Book, Vol XXVII, 11 April 1799: 'Our worthy member Isaac Alves Rebello Esq; exhibited to the society three figures, supposed Indian Deities, in wood, found in June 1792, in a natural cave, near the summit of a mountain, called Spot's in Carpenters Mountains, in the parish of Vere, in the island of Jamaica, by a surveyor in measuring the land: they were discovered placed with their Faces, one of which is that of a Bird, towards the East. The society returned thanks to Mr. Rebello for this highly curious and very interesting Exhibition'	Isaac Alves Rebello?
Low-backed duho [1] Am1918,-.1	1820	1918	Eleuthera, Bahamas	Inscription on stool's ventral surface: 'The Stool Was found in a Cave in the Island of Eleuthera, Bahamas, about the year 1820 by James Thompson, a Slave, and purchased of him by Theos. Pugh Wes. Missy in 1835. It is supposed to be either a piece of domestic furniture of the Indians or one of the Gods. It is at least 300 years old. 1850' (See Ostapkowicz, 2013).	C. D. Saul (purchased via the Christy Trust)
Cohoba/canopied stand (Bird and turtle) [2] Am, MI.168	Pre-1857	1866	Dominican Republic	Robert Schomburgk, British Consul to the Dominican Republic between 1849 and 1857, recounted that '…my discoveries of Archaeological subjects [from 'Santo Domingo'] were great, consisting among others… [of a] *carving… of mahogany wood representing an eagle feeding a turtle*' (in Rafn, 1858: 47, emphasis added).	Purchased from William Wareham (dealer) via the Christy Trust
Bird head [9] Am.2159	Pre-1865?	1860–1869	'The Caribes'	Part '…of the original Christy collection' (Joyce, 1907: 403), suggesting that it was acquired by Christy prior to his death in 1865.	Henry Christy
Duho/platter [4] Am.9753	Pre-1870	1876	Cave at Isabella, ca. 30 miles from Porto Plata, Dominican Republic	Letters on file, Christy correspondence C; translation of Imbert's letter of 17 May 1870, addressed to Capt. Melfort Campbell: 'Most Excellent Sir, I have the pleasure to remit to your Honour the "Indian Idol" together with its corresponding certificate, praying that your Honour will accept the same as a curiosity from my unfortunate country (though deserving a better fate). I avail myself of this opportunity most excellent Sir to indicate to your Honour the sentiments of high consideration and respect with which I subscribe myself, Your Honour's most Obdt. Servt, S. Imbert'. Accompanying letter from Theodore Farington, British Consul, Porto Plata, Santo Domingo: 'This is to certify that the carving now forwarded and presented by General Segunda Imbert was found in a cave at Isabella about 30 miles from Porto Plata, Santo Domingo. Supposed to have been made about the year 1370. The wood is Lignum Vitae. The cave was inhabited by Indians before Columbus discovered the island – Theodore Farington, B.R. Consul'; first published: 22 March 1877 List of the Trustees: 'Central America and West Indies: 3 celts from Turks and Caicos Islands, West Indies, and a very remarkable metatl of wood in the form of a human figure, from Captain Melfort Campbell, President of Nevis'.	Captain Melfort Campbell
High-backed duho [3] Am1949, 22.118	Pre-1928?	1949	Hispaniola	Believed to have entered the Oldman collection by 1928 (Waterfield and King, 2009: 69).	Mrs. William O. Oldman

on a wide variety of forms, limited only by the material used (including stone, shell, coral, wood and cotton) and the skills of the carver/weaver. The term *cemí* more broadly refers to the animating force within the sculpture (Oliver, 2009: 60): according to a 15th century Taíno myth documented in Hispaniola (today's Haiti and Dominican Republic), this force would embody a tree at will, making its branches or even roots move (Arrom, 1999: 25). With the power to speak, it made its presence known – demanding it be carved in a certain way, and that certain protocols be followed (such as the performance of the *cohoba* ceremony by a *behique*, or shaman) before it revealed its name, and so its powers. According to Taíno belief, these carvings were therefore much more than inanimate objects; they were tangible embodiments of a greater connective whole, linking supernatural beings directly with/to people's actions.

2. Methodology: ^{14}C dating, wood and resin identification and stable isotopes

The corpus of nine carvings includes examples that span key categories of Taíno ritual paraphernalia – three *duhos*, encompassing the main duho styles (high-back [3], low-back [1] and extended [4]) (Ostapkowicz, 1997, 1998); two *cohoba* stands [2; 6] and four figural sculptures [5; 7–9], of which three can be classified within the *cemí* tradition [5; 7–8], while the fourth is atypical of Taíno carving and will be discussed separately [9]. Each piece

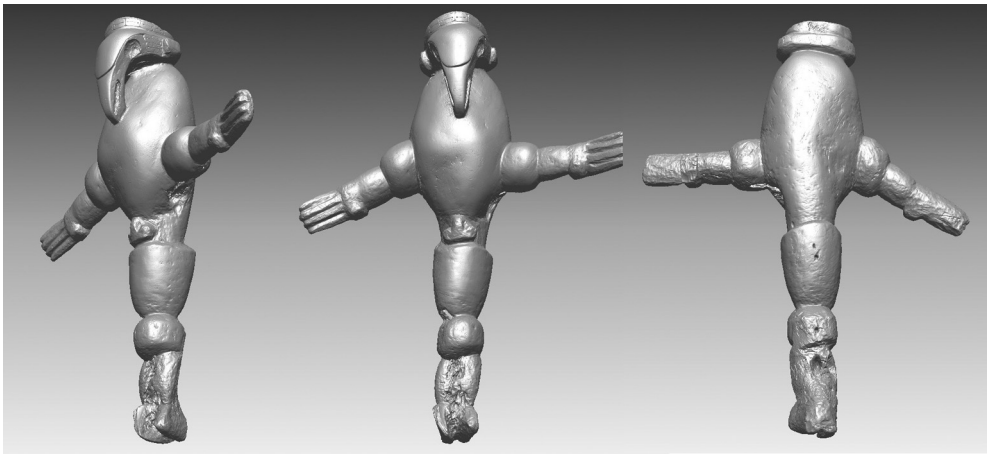

Fig. 1. Screenshots of the Carpenters Mountains 'Birdman' [8] 3D computer model. Eight of the nine British Museum carvings were 3D laser scanned to produce high resolution 3D digital models. Images by Conservation Technologies, National Museums Liverpool, combined in Photoshop by Ostapkowicz. Courtesy, The Trustees of the British Museum.

provided at least one AMS ^{14}C determination, with sampling area strategically targeted for obtaining a terminus date (when the tree was felled, and presumably carved), ideally in sapwood or, where this was not present, the outermost edge of the carving as oriented within the bole of the tree (see Ostapkowicz et al., 2012a; Brock et al., 2012 for detailed discussion of sampling strategy). Five of the larger pieces were also selected for multiple determinations, specifically to address the growth rates of what were assumed to be long-lived trees (*Guaiacum* sp., see below). This provided additional checks on the consistency of the results, as well as providing data for a growth-rate model for *Guaiacum* sp., which ultimately aided the interpretation of other carvings in the wider study, where sapwood was not present or where multiple dates were not possible (see Brock et al., 2012). This approach explicitly addressed the issues of in-built wood age, as well as providing an indication of the age of trees being selected for carving. Multiple dates also allowed the application of Bayesian modelling that further fine-tuned the chronological resolution on selected carvings (Ostapkowicz et al., 2011a; Brock et al., 2012).

Three of the carvings featured resins in sufficient quantity for analysis [6.1; 7.1; 8.1]. Resins were originally used to adhere inlays of shell or *guanin* (a gold-copper alloy) in the mouth, eyes and/or ears of the sculpture. As metabolically active elements of the tree (Tans et al., 1978), resins were likely used fresh – and so were selected for dating to determine the final phase of use, and provide a cross-reference to the results achieved on the terminus wood samples for each carving. Barring any contamination issues, any difference in age between the wood and resin dates was used to explore the possibility of the carving's refurbishment (i.e., the replacement of inlays that became loose over time as the resin adherents dried out).

Sampling was tailored to each object to ensure optimum results while minimising visual impact. It was dependent on the condition of the object, and the presence/absence of resins, and related to specific questions over the growth of the selected woods. For example, four dates were obtained on the large anthropomorphic figure from Carpenters Mountains, Jamaica (three on wood and one on resin [7.1–4]), with additional samples taken for wood identification and strontium isotope analyses. In total, 33 samples were taken from the nine carvings: 17 for ^{14}C dating (14 wood and 3 resin, including sufficient material for duplicate treatments undertaken on two of the carvings [8, 9] as part of routine in-house quality control procedures – hence providing a total of 19 determinations), nine for wood identification (Cartwright, 2011) and seven for strontium isotope analysis. Wood sample size for ^{14}C and isotope analysis ranged from 10 to 50 mg each, with generally smaller sample size for identification and dating of resins (ca. 7–33 mg), due to their high carbon content. Wherever possible, sampling was kept to damaged areas or already present fissures; samples were extracted with a scalpel along the wood's grain, to minimise disturbance.

Wood samples were prepared for AMS ^{14}C dating using standard procedures at the Oxford Radiocarbon Accelerator Unit, as described by Brock et al. (2010). All samples except for the Hispaniolan high-back duho [3] were given an initial solvent wash consisting of rinses with acetone (45 °C, 1 h), methanol (45 °C, 1 h) and

Fig. 2. Impressions left by different woodworking tools (not to scale), all *Guaiacum* sp.: left and centre, signature adze marks on the Jamaican Carpenters Mountains 'Birdman' sculpture [8]; right, the back of the Carpenters Mountains Anthropomorph [7], showing heavy scarring from adzing and scrapping tools. Courtesy, The Trustees of the British Museum.

chloroform (room temperature, 1 h) and then left to air dry before being subjected to a routine acid–base–acid–bleach treatment as follows: 1 M HCl (80 °C, 20 min), 0.2 M NaOH (80 °C, 20 min), 1 M HCl (80 °C, 1 h), 5.0% w/vol $NaClO_2$ at pH3 (80 °C, up to 30 min), with thorough rinsing with ultrapure MilliQ™ water between each step. The Hispaniola high-back duho [3] underwent a similar treatment but without the initial solvent wash sequence, and with a 2.5% bleach solution. The samples were then freeze-dried before being combusted, graphitised and dated as described by Brock et al. (2010). $\delta^{13}C$ values for each sample were measured during the combustion stage using a CF-IRMS system and are reported as delta per mil relative to VDPB (Brock et al., 2010).

The resin samples were not given any pre-treatment prior to dating, as the solvents that would routinely be used to remove contaminants from other sample materials prior to dating were likely to dissolve the resins themselves. Instead, care was taken to sample resin away from exposed surfaces that may have been subject to conservation treatment. Samples of approximately 3 mg were combusted directly, with the resultant CO_2 distilled cryogenically and graphitised prior to AMS dating as described by Brock et al. (2010).

The issue of past conservation treatments cannot be excluded, especially as there are no conservation records for the carvings prior to 1992. Resin samples for characterisation by gas chromatography/mass spectrometry (GC/MS) were taken from already damaged areas, in parallel with the ^{14}C samples, both to help identify the resin, and also to check for any obvious modern contaminants (e.g., shellac – Stacey and Higgitt, 2007). Samples of ca. 2 mg were crushed to a powder and then solvent extracted with 250 μl dichloromethane, heating at 55 °C for 3 h with intermittent agitation. The sample extracts were decanted, dried under a stream of nitrogen and then derivatised prior to analysis with bis(-trimethylsilyl)trifluoroacetamide (BSTFA) +1% trimethylchlorosilane (TMCS) to form trimethylsilyl (TMS) derivatives. Procedural blanks were prepared alongside the samples to monitor for background contamination.

The samples were analysed using an Agilent 6890N gas chromatograph (GC) coupled to an Agilent 5973N mass spectrometer (MS). Injection was in splitless mode at 280 °C and 10 psi, with a purge time of 0.8 min. An Agilent HP5-MS, 30 m × 0.25 mm, 0.25 μm film thickness, column fitted with 1 m × 0.53 mm retention gap was used. The carrier gas was helium in constant flow mode at 1.5 ml/min. After a 1 min isothermal hold at 35 °C the oven was temperature programmed to 340 °C at 10 °C/min with the final temperature held for 10 min. The MS interface temperature was 300 °C. Acquisition was in scan mode (50–650 amu/sec) after a solvent delay of 7.5 min. Mass spectral data were interpreted manually with the aid of the NIST 2008 Mass Spectral Library and comparison with published data (Bandaranayake, 1980; van der Doelen, 1999; Stacey et al., 2006).

Unlike the critical approach to the ^{14}C sample sites, the strontium isotope sample areas were not restricted, and were taken from already damaged areas to minimise impact. Despite this, it was not possible to sample sufficient material in the case of two duhos [3–4] as it was decided that further sampling would unacceptably affect their appearance. Strontium isotope values are related to the bioavailable strontium isotope ratio in the soil where the tree grew (Åberg, 1995). The $^{87}Sr/^{86}Sr$ values of limestone islands, such as those of the Bahamas, are easily distinguishable from those of older volcanic islands, including parts of the Dominican Republic. Comparative modern wood values were established specifically for this project through select herbarium collections (BRE, USDA Forest Services, Oxford Xylarium) as well as field collecting in the Bahamas and Turks and Caicos Islands (Ostapkowicz et al., 2012b). In addition we were able to compare our strontium isotope data to recently published modern baseline values for other regions of the Caribbean as presented in Laffoon et al. (2012). This analysis is in its early stages, as we need to establish more comprehensive baseline values for the Caribbean through the collection and measurement of modern wood from the full range of geological substrates in the region. Therefore, the interpretations of provenance here are only initial indications based on the current available reference strontium isotope values.

Modern and archaeological wood samples were prepared for strontium isotope analysis following methods outlined in Reynolds et al. (2005) where approximately 1–10 mg of wood was cleaned and then ashed at 850 °C before being prepared following standard preparation procedures and measurements using a ThermoFinnigan Neptune multicollector ICP-MS at the Department of Human Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany (see details in Copeland et al., 2008).

3. Results

The 19 radiocarbon results from the artefacts in the British Museum study are listed in Table 2, alongside the summary of wood and resin identifications, with strontium isotope results provided in Table 3. All ^{14}C determinations were calibrated using IntCal09 (Reimer et al., 2009) and OxCal v4.2.2 (Bronk Ramsey, 2013), and in the following discussions are presented at 95.4% confidence, unless otherwise noted. For ease of reference, all bracketed numbers in the text [1–9] cross-reference with the tables, where more detailed information can be found concerning each artefact (accession number, provenance, details of the calibrated probabilities, acquisition histories, isotope results, etc.). Two samples had auto-duplicate dates [8.3; 9.2], which have been combined using the R combine function in OxCal and are listed in Table 2 [8.4; 9.3]; these are used in the discussion below in preference to the individual dates.

The results establish a chronological framework for the carvings, and provide identifications for the materials used in their manufacture and maintenance. The radiocarbon results fall between ca. AD 1000 and 1635, well within the period of emerging complexity in the Caribbean (e.g., Curet, 1996; Rouse, 1992; Oliver, 2009). The $^{87}Sr/^{86}Sr$ results range between 0.708764 and 0.709244, in keeping with modern values from the Caribbean (Laffoon et al., 2012). Eight of the nine carvings have been identified as *Guaiacum* sp., with the ninth being *Carapa* sp. (Cartwright, 2011), parallelling findings in the wider project, which are also dominated by *Guaiacum* sp. (Ostapkowicz et al. 2011a, 2012a).

Two different resins have been identified through GC/MS: 1/a composition of pentacyclic oleanane and ursane triterpenoid compounds characteristic of resins from plants in the Burseraceae family (Pernet, 1972), possibly *Protium* or *Bursera* sp. [7.1] (see Stacey et al., 2006; Ostapkowicz et al., 2011a, 2012a) and 2/a resin with a distinct, phenolic-rich composition, which is still under investigation [6.1; 8.1]. Note that there is a seeming discrepancy between the identification of one resin as Burseraceae [7.1] and its associated $\delta^{13}C$ value (−13.7‰), which is indicative of a C4 or CAM plant (all known species of Burseraceae are C3 plants) – this issue is undergoing further investigation. In addition, the GC/MS analysis on the resins did not reveal any significant contamination from conservation materials, apart from low levels of fatty acids – likely surface grease from past handling or polishing of the objects – as well as plasticizers from contact with packing materials and low levels of bromophenol, probably a pesticide residue. These latter contaminants were all very minor components compared to the resin compounds. This adds a level of confidence to the results, although with the caveat that any contaminants not amenable to the solvent extraction method employed would not appear in the GC/MS analysis.

Table 2
Summary of ^{14}C, wood and resin results for the Caribbean sculptures in the British Museum. 19 AMS radiocarbon results (excluding combined dates listed in 8.4, and 9.3) from the nine British Museum artefacts included in the British Academy-funded 'Pre-Hispanic Caribbean Sculptural Arts in Wood' project (56 artefacts form the wider project, supported by the Getty Foundation, were reported in Ostapkowicz et al. 2012a). The Oxford Radiocarbon Accelerator Unit lab numbers (OxA) are provided alongside the material and sample site (e.g., terminus: sapwood or outer growth rings, to indicate when tree was felled and likely carved; pith: age of tree; growth: selected areas within the bole marking growth rates). Multiple dates are listed sequentially after the artefact number, with terminus dates (resin, then wood) listed first, followed by growth rates with pith dates last (e.g., [6.3] [7.4]). Dates BP and calibrations at 95.4% are listed, the most likely calibration ranges highlighted in bold. All dates are calibrated using the IntCal09 dataset (Reimer et al., 2009) and OxCal v4.2.2 (Bronk Ramsey, 2013).

Island group		Artefact/acc. no.	Provenance	Material	OxA	$\delta^{13}C‰$ (VPDB)	^{14}C BP	Calibrated date range
Bahamas	1	Duho (low-back) Am1918,-.1 (Fig. 3)	Eleuthera, Bahamas	*Guaiacum* sp. (terminus date)	OxA-21155	−25.6	804 ± 25	**AD 1186-1273 (95.4%)**
Hispaniola	2.1	Canopy/cohoba stand ('Bird and Turtle')	Dominican Republic	*Carapa* sp. (terminus date)	OxA-21149	−24.4	801 ± 24	AD 1189–1197 (1.6%) **AD 1207–1274 (93.8%)**
	2.2	Am,MI.168 (Fig. 4)		*Carapa* sp. (pith)	OxA-21148	−24.8	805 ± 24	**AD 1186–1273 (95.4%)**
	3	Duho (high-back) Am1949, 22.118 (Fig. 5)	Hispaniola	*Guaiacum* sp. (terminus date)	OxA-15483	−23.7	621 ± 26	**AD 1292–1399 (95.4%)**[a]
	4	Duho (extended) Am.9753 (Fig. 6)	Cave, Isabella, Dominican Republic	*Guaiacum* sp. (terminus date)	OxA-21154	−24.1	606 ± 25	**AD 1297–1405 (95.4%)**
Jamaica	5.1	Small anthropo., Am1997, Q.793 (Fig. 8)	Jamaica?	*Guaiacum* sp. (terminus date)	OxA-21153	−24.9	757 ± 25	**AD 1224–1282 (95.4%)**
	5.2			*Guaiacum* sp. (pith)	OxA-21152	−25.4	869 ± 25	AD 1046–1090 (13.1%) AD 1120–1140 (3.7%) **AD 1148–1224 (78.6%)**
	6.1	Canopy/cohoba stand	Carpenters	Resin (ID pending)	OxA-21114	−16.5	455 ± 25	**AD 1416–1464 (95.4%)**
	6.2	Am1977, Q.1	Mountains	*Guaiacum* sp. (terminus date)	OxA-21113	−24.8	943 ± 26	**AD 1028–1156 (95.4%)**
	6.3	(Fig. 11)		*Guaiacum* sp. (pith)	OxA-21145	−24.7	981 ± 26	**AD 994–1054 (49.2%)** **AD 1078–1154 (46.2%)**
	7.1	Cemí ('anthropomorph')	Carpenters	Resin (Burseraceae resin; R eye)	OxA-21143	−13.7	432 ± 24	**AD 1426–1487 (95.4%)**
	7.2	Am1977, Q.3	Mountains	*Guaiacum* sp. (L foot − terminus date)	OxA-21142	−25.1	718 ± 26	**AD 1256–1300 (91.6%)** AD 1368–1382 (3.8%)
	7.3	(Fig. 10)		*Guaiacum* sp. (R foot − growth rates)	OxA-21141	−25.6	779 ± 26	**AD 1217–1277 (95.4%)**
	7.4			*Guaiacum* sp. (R foot − pith)	OxA-21144	−24.9	737 ± 25	**AD 1227–1291 (95.4%)**
	8.1	Cemí, ('Birdman')	Carpenters	Resin (ID pending)	OxA-21147	−25.2	345 ± 24	**AD 1466–1635 (95.4%)**
	8.2	Am1977, Q.2	Mountains	*Guaiacum* sp. (sapwood)	OxA-21146	−26.1	941 ± 25	**AD 1029–1156 (95.4%)**
	8.3	(Fig. 9)		Auto-duplicate date	OxA-22535	−25.2	995 ± 23	**AD 990–1048 (74%)** AD 1088–1123 (16.8%) AD 1138–1150 (4.6%)
	8.4			Combined, χ^2-Test: df = 1 T = 2.5 (5% 3.8)			970 ± 17	**AD 1018–1050 (45.8%)** AD 1083–1125 (37.9%) AD 1136–1152 (11.7%)
Unprovenanced	9.1	Bird head, Am.2159 (Fig. 12)	'The Caribes'	*Guaiacum* sp. (terminus date)	OxA-21150	−24.4	725 ± 25	AD 1240–1245 (0.7%) **AD 1251-1298 (94.0%)** AD 1372–1377 (0.7%)
	9.2			Auto-duplicate date	OxA-21151	−24.4	693 ± 25	**AD 1268–1306 (75.5%)** AD 1363–1385 (19.9%)
	9.3			Combined, χ^2-Test: df = 1 T = 0.8 (5% 3.8)			709 ± 18	**AD 1266–1297 (95.4%)**

[a] This piece appears to have had extensive conservation treatment, including the use of shellac, conifer resins, beeswax and animal glue (Stacey and Higgitt, 2007).

Table 3
The results of seven of the nine Caribbean carvings in the British Museum collections selected for strontium isotope analysis. The remaining two, both duhos [3–4], only provided sufficient material for the prioritised ^{14}C date; further sampling was deemed too intrusive given their largely intact surfaces.

Island group		Artefact/acc. no.	Proven.	Lab no. (S-EVA)	$^{87}Sr/^{86}Sr$
Bahamas	1	Duho (low-back), Am1918,-.1	Eleuthera, Bahamas	14,313	0.709244
Hispaniola	2	Canopy/cohoba stand ('Bird and Turtle'), Am,MI.168	Dominican Republic	14,314	0.708876
Jamaica	5	Anthropomorphic cemí (small), Am1997, Q.793	Jamaica	14,311	0.708781
	6	Canopy/cohoba stand, Am1977, Q.1	Carpenters Mountains	14,308	0.708784
	7	Anthropomorphic cemí, Am1977, Q.3	Carpenters Mountains	14,310	0.708767
	8	Cemí, 'Birdman', Am1977, Q.2	Carpenters Mountains	14,309	0.708945
Unproven.	9	Bird head, Am.2159	'The Caribes'	14,312	0.709168

4. Discussion

Taking their 95.4% probabilities into account, the dates obtained on the British Museum (BM) carvings range from AD 1018–1152 [8.4] to AD 1466–1635 [8.1] – comfortably spanning the late pre-colonial settlement phases of most Caribbean islands. By the time of European contact (1492), large-scale *cacicazgos* (chiefdoms) dominated the larger islands, with paramount *caciques* (chiefs) taking control of local and regional resources and maintaining both inter- and intra-island networks for access to valuable commodities (e.g., Oliver, 2009; Hofman et al., 2008). A uniquely Caribbean material culture – including *duhos*, *cemís* and drug-related paraphernalia (elaborately carved snuff tubes, vomiting spatulas and *cohoba* stands) – was well established by this time, in the service of leaders vying for power, and participants in complex ceremonies involving the ingestion of *cohoba* (a powdered narcotic, possibly derived from *Anadenanthera peregrina*).

The discussion progresses according to artefact provenance, south from Bahamas to Jamaica, and within this from the earliest to the latest examples (based on terminus *post quem* dates). A brief chronological context is provided for the island/region, where provenance is firm; where it is not clear, the discussion explores how the strontium isotope results inform on the possible material source. Further work with archival information has assisted in clarifying provenance and histories of some of the pieces, and will be incorporated below where appropriate.

4.1. Bahamas (ca. AD 1100–1300)

Among the earliest Caribbean carvings in the BM collections is the duho recovered from Eleuthera, Bahamas [1] (Fig. 3), dating to AD 1186–1273: this low-back marks the northernmost extent of known duhos in the Caribbean archipelago. A slightly earlier result of AD 1044–1215 was obtained on a large high-backed example attributed to Turks and Caicos Islands (Ostapkowicz et al., 2012a), and together, these results indicate that the duho as a category (both high and low-backed) was well established in the northern Caribbean by, or shortly after, AD 1000.

Currently, the earliest reliable radiocarbon determinations from an archaeological site on Eleuthera derive from two burials at Preacher's Cave (a third yielded what was seen as an unacceptably early result), providing calibrated ranges of AD 810–1010 and AD 1040–1260 (Schaffer et al., 2010: 52–53), broadly contemporary with the Eleuthera duho, particularly if the earlier of the two dated humans is subject to a marine reservoir effect, as suggested by its moderately elevated $\delta^{13}C$ value of −17.1‰ (Rick Schulting, personal communication, 2012). If the duho is from the island (i.e., not traded in), its date suggests that these ceremonial seats were of relevance early in the history of Eleuthera settlement. And if their status as elite accoutrements can be inferred – as was the case in the Greater Antilles, from whence migrants travelled (Keegan, 1997: 28; Berman, 2011: 106–108) – the Lucayans were maintaining some of the social mores of their ancestral homelands through their use. Further, in its similarities to later Bahamian low-backs from Long and Cat Islands, the Eleuthera duho foreshadows some of the stylistic conventions that are later in evidence in the region (Ostapkowicz, 2013). The duho's date also parallels the development of a uniquely Lucayan style, seen in the production of Palmetto Ostionoid ware (a shell-tempered pottery) which marked an adaptation to life in this northern archipelago (Berman and Gnivecki, 1993; Keegan, 1997).

The strontium result for the duho (0.70924) falls above both the range of other carvings from the Bahamas/TCI region (0.70914–0.70917) and that of the comparative dataset established for this project, which consisted of 91 modern *Guaiacum* sp. and *Swietenia* sp., samples from the Bahamas (Long and Cat Island) and the Caicos chain of the Turks and Caicos Islands (TCI), ranging from 0.70914 to 0.70920 (Ostapkowicz et al. 2012b: 27). The Eleuthera value may simply be a statistical outlier, and the tree from which the duho was carved could still derive from a Quaternary limestone Bahamian island, or, alternatively, from one of the coastal areas with a similar geology on the larger islands to the south (e.g., Hispaniola or Cuba). If, however, its value is accepted, then the carving may have originated from a region with a contribution from older/more radiogenic rock on one of the larger islands of the Greater Antilles (Ostapkowicz, 2013).

4.2. Hispaniola (ca. AD 1100–1400)

There are potentially three Hispaniolan carvings in the BM holdings [2–4]. Although one of these [2] lacks clear provenance in the museum records – apart from a 'Carib' attribution – studies carried out during the course of this project suggest that it can be fairly confidently attributed to Hispaniola. This is an elaborate cohoba stand featuring the unique combination of a bird (possibly pelican) perched atop a turtle, their linked beaks suggestive of a

Fig. 3. Low-backed duho, *Guaiacum* sp., AD 1186–1273, Eleuthera, Bahamas [1]. L: 355 mm; W: 196 mm; H: 105 mm (max). The duho bears an inscription on its ventral surface, recounting the history of its discovery in 1820 by James Thompson, and its later purchase by Theophilus Pugh, a Wesleyan Missionary working in the Bahamas in 1835. Courtesy, The Trustees of the British Museum, Am1918,-.1.

Fig. 4. Cohoba stand, *Carapa* sp., AD 1189–1274, Hispaniola [2]. H: 660 mm; W: 310 mm (max); D: 260 mm. The carving depicts a bird, possibly a pelican, perched atop a turtle. The column that emerges from the back of the bird originally had a circular platform which held the cohoba narcotic during the eponymous ceremony. Courtesy, The Trustees of the British Museum, Am, MI.168.

feeding posture (Fig. 4). Two lines of evidence support the Hispaniolan attribution, the first archival: in a letter to the Danish antiquarian and scholar Carl Christian Rafn, Robert Schomburgk (b. 1804; d. 1865), British Consul to the Dominican Republic between 1849 and 1857, recounted that '…my discoveries of Archaeological subjects [from 'Santo Domingo'] were great, consisting among others… [of a] *carving… of mahogany wood representing an eagle feeding a turtle*' (in Rafn, 1858: 47, emphasis added). The description is brief but clear: no other carvings of this style are known in the 300 strong corpus of pre-Hispanic wood carvings now held in museums and private collections (Ostapkowicz, 1998). Generally, bird iconography on *cohoba* paraphernalia occurs from the Virgin Islands north to Cuba, but it is particularly evident in the Dominican Republic. Schomburgk's extensive travels throughout the Dominican Republic and his keen interest in the archaeology of the region (Schomburgk, 1852a, b), together with his ethnographic and archaeological collecting (his stone and ceramic collections from the Dominican Republic entered the British Museum in 1853) (Rivière, 2007: 211; McEwan, 2008: 239), all lend support to the likelihood that the carving, also from this island, was sent to Britain, eventually to enter the British Museum via the Christy Fund in 1866 (Joyce, 1907: 403).

Without the above information coming to light, it would be difficult to attribute a provenance to the *cohoba* stand based on its strontium results alone (0.70887), although we can discount the comparatively recent (in geological terms) limestone islands of the Bahamas/Turks and Caicos (reference samples averaging 0.70917 ± 0.00012) as possible sources for the wood. In contrast, seven measurements on plants, snails and rodents from the Dominican Republic average 0.70865 ± 0.00037 (Laffoon et al., 2012: 2379), and six measurements made specifically on *Guaiacum* sp., undertaken as part of this study, averaged 0.70866 ± 0.00085. While the value for the carving is thus consistent with these measurements, this is not sufficient on its own to confirm its provenance, as other islands, such as Jamaica and Cuba, can provide similar values. In conjunction with the archival information noted above, however, a convincing case can be made for an attribution to the Dominican Republic.

The 'bird/turtle' cohoba stand's determination of AD 1189–1274, is later than the two Hispaniolan stands included in the wider study (ca. AD 975–1180; see discussion in Ostapkowicz et al., 2012a), yet still some centuries prior to the documentation of such stands by the early *cronistas* (Spanish chroniclers) (e.g., Colón, 1992: 151). Although complex drug paraphernalia – in the form of cohoba stands, vomiting spatulas and snuff tubes – were thought to have emerged post-AD 1200 (Rouse, 1992: 119), the results from the wider study confirm their use by at least AD 1000 (Ostapkowicz et al., 2012a), and, judging by the artistic calibre of these early

Fig. 5. High-backed duho, *Guaiacum* sp., gold/guanin (?), AD 1292–1399, Hispaniola [3]. L: 435 mm; W: 164 mm (max). The degree to which the duho has been reconstructed during its long history of display does warrant caution with the date achieved. Courtesy, The Trustees of the British Museum, Am1949, 22.118.

pieces, it is highly likely that they were preceded by other, equally complex examples.

Among the best known and most iconic Taíno carvings is the gold or *guanin*-inlayed, 'black', high-back duho that entered the British Museum collections in 1949 (Braunholtz, 1951: 54). It is featured in almost every catalogue on Taíno art, and often described as a 'classic' example of the duho category [3] (Fig. 5). It is here dated to AD 1292–1399, preceding Columbus' descriptions of gold-encrusted, high-backed stools by at least a century (Colón, 1992: 69). Given that it matched this and other early cronista descriptions so well, many have considered it a 15–16th century carving, possibly even one of the fourteen duhos gifted by *cacica* (chieftess) Anacaona to Bartolome Colon in 1497 (Kerchache, 1994b: 52). But William O. Oldman, the previous owner of the duho and a major English collector of ethnographic materials in the mid-1900s, claimed that it was found in a Hispaniolan cave (Oldman, 1953: 46). He acquired it between 1920 and 1928 (Hermione Waterfield, personal communication, 2007), and when it entered his collection it was – curiously – completely covered '…with a very thick coat of vegetable varnish which hid the inlay and also preserved the highly polished and worn surface' (Oldman, 1953: 46). The presence of this thick 'varnish' would call into question the celebrated black colour of the piece as being original – it has long been lauded as one of the prime surviving examples of the 'black' wood carving so admired by the Spanish (Helms, 1987). But residues (such as the 'vegetable varnish') left on wood have a tendency to stain or darken it. Additionally, once the varnish was removed the surface was consolidated with additions of conifer resin, plant oil and shellac, among other materials (Stacey and Higgitt, 2007). These two factors would cast doubt on whether the current dark colouring is original to the duho.

The degree to which the duho has been reconstructed during its long history of display warrants caution concerning the AMS result: although the sample was taken from beneath the duho's chin, and so some distance from the deteriorated hind legs which have a history of conservation treatment (Stacey and Higgitt, 2007), the carving clearly has had other treatments that add an element of uncertainty to the date. An extensive area of the duho's ventral surface features a shiny coating consisting of the varnish of conifer resin and plant oil mentioned above (Stacey and Higgitt, 2007: 4). If this extended over the sampling area, then there may be issues of contamination with the date, as the ^{14}C sample was not solvent washed like the other samples. However, Cartwright (2011) extracted the sample submitted for AMS ^{14}C dating, and noted that it was 'un-degraded and free from conservation consolidants', which adds a level of confidence to the results.

Furthermore, if unrecognised modern contaminants were present, they would make the determination too young rather than too old (as modern materials such as shellac, conifer resin and beeswax would be expected to date to approximately the same period as the time of application). Hence, if this were the case, the duho may be even older than its date of AD 1292–1399.

The other Hispaniolan duho in the BM collections – an extended style that could also have functioned as a platter [4] – is an exceptional sculpture featuring a prone, ithyphallic male figure, its back carved as the seating/platter surface (Fig. 6). It has a well-documented history stretching back to 1870, when General Segunda Imbert of the Dominican Republic presented it as a gift to Captain Melfort Campbell, then President of the Turks and Caicos Islands. It was accompanied by a certificate, written by Theodore Farrington, British Consul in Santo Domingo, indicating that it had been "…found in a cave at Isabella, about 30 miles from Porto Plata [Puerto Plata], Santo Domingo. Supposed to have been made about the year 1370. The wood is Lignum vitae" (Farrington in Christy correspondence file C, BM). Melfort Campbell appears to have had it in his possession for a few years before presenting it to the

Fig. 6. Extended duho/platter, *Guaiacum* sp., AD 1297–1405, ca. Isabella, Dominican Republic [4]. L: 730 mm; W: ca. 270 mm (max); H: 210 mm (max). Courtesy, The Trustees of the British Museum, Am9753.

collection of Mr. Webb of Newstead Abbey – but because of its "indecent nature" it could not be displayed, and so Melfort Campbell turned to Sir Augustus Wollaston Franks, Keeper of British and Mediaeval Antiquities and Ethnography at the British Museum (1866–1896) and one of four chairmen of the Christy Collection, to see whether the museum would take this "white elephant". It entered the Christy Collections in 1876 together with three celts from the Turks and Caicos, and was listed as a "very remarkable metatl of wood in the form of a human figure" in the Museum's 1877 Trustee report (British Museum, 1877: 20).

Farrington's original date estimate of 1370 proved a very good guess: the 'Isabella' duho dates to AD 1297–1405, and is one of only two surviving examples of this 'extended' duho/platter category – the other being in the collections of the St Louis Museum of Art – with both linked to the Puerto Plata region, in northern Dominican Republic (Ostapkowicz et al., 2011a: 946, 2012a: 2248). Both feature naturally rendered (though unnaturally positioned) limbs extending from bodies that serve as inverted platforms, arms tightly flexed below the head, fingers and toes curled in on themselves, and deeply recessed facial features. Both overlap chronologically: the wood date from the duho in the St Louis Museum's collections is AD 1298–1410, with the resin falling slightly later at 1319–1433, suggestive of a single phase of manufacture (Ostapkowicz et al., 2011a: 954).

The wood dates on the two Puerto Plata duhos/platters can be successfully combined in OxCal to AD 1310–1410 (χ^2-Test: df = 1 T = 1.4 (5% 3.8)) (Fig. 7), consistent with the proposition that they were carved at the same time. The strong similarities in style and their clear chronological overlap would suggest that this may be a regional style and/or the work of the same artist working on the north coast of the Dominican Republic. Together with the Oldman duho discussed above [3], these carvings provide a clear indication of the diversity of Hispaniolan duho styles during the 14th century.

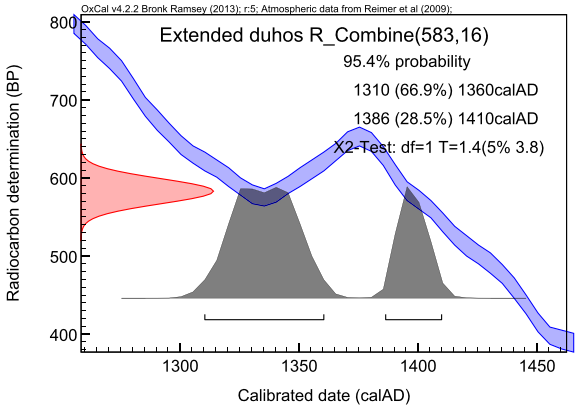

Fig. 7. Plot showing the combined wood and resin dates from the extended duho now in the collections of the St Louis Art Museum (acc. no. 168:1981) and the British Museum's extended duho [4]. The two wood dates are successfully combined in OxCal to AD 1310–1360 (66.9%), with a slightly lower probability at AD 1386–1410 (28.5%) (χ^2-Test: df = 1 T = 1.4 (5% 3.8)), consistent with the proposition that they were carved at the same time.

4.3. Jamaican carvings (AD 1000–1500)

Four carvings are provenanced to Jamaica in the BM collections: three with clear provenance to a cave near the summit of 'Spots', in Carpenters Mountains, southern Jamaica (Joyce, 1907; Handler, 1977; Oliver et al., 2008), while one has some associated uncertainty. The latter, a small anthropomorphic cemí dating to AD 1224–1282 [5.1] (Fig. 8), bears a striking similarity to the large Carpenters Mountains anthropomorphic figure [7] (Fig. 10), acquired by the BM at some point in the early 19th century. But the smaller carving may have entered the collections a half-century earlier: on 20 May 1757, James Theobald, Esq. donated to the museum a "wooden image brought from Jamaica… supposed to be an American idol" (see Table 1). The carving had no associated information, and remained unidentified in the collections until quite recently, when its early accession history, and its Jamaican provenance, were tentatively reinstated (McEwan, 2008: 234; Saunders and Gray, 1996: 801). The figure's strontium isotope result (0.70878) is not inconsistent with this attribution, as it closely matches the results from the Carpenters Mountains figures (0.70876–0.70894), and also compares favourably with the mean $^{87}Sr/^{86}Sr$ value (0.70877) reported for Jamaican plant and animal samples (Laffoon et al., 2012). Furthermore, the wood dates on the two anthropomorphic figures overlap (see discussion below), suggesting that they reflect a late 13th–mid-14th century style, perhaps specific to the local region. These aspects converge to support a Jamaican provenance for this small carving.

The Carpenters Mountains sculptures [6–8] are significant not simply because they chart some of the most innovative pre-colonial carving styles seen from the entire Caribbean archipelago, but because they were found together, suggesting a collective history that may have seen them functioning as a 'set'. They are substantial sculptures, each carved from large tree sections, with two incorporating branches in the depiction of appendages: arm/wings in the case of the 'Birdman' [8] (Figs. 1 and 9) and legs in the case of the large anthropomorph [7] (Fig. 10). Their sizes facilitated an investigation of the issue of wood age, using multiple ^{14}C determinations to estimate the growth rates of the selected trees (Brock et al., 2012). For each carving, a minimum of two radiocarbon dates was obtained on the wood, alongside resin dates to determine the final stages of manufacture/renewal. The results are provided in Table 2 [6–8], and reveal a deeper and more complex history of use for this group than originally anticipated.

The terminus wood determinations for the canopied cemí [6] (Fig. 11) and the 'Birdman' [8] are essentially identical (ca. AD 1028–1156; [6.2; 8.2]), while the anthropomorph [7] provides a significantly later estimate of AD 1256–1300 (91.6% probability) [7.2]. Thus, although they were found together as a group, a minimum of 100 years separates the age of the wood used for the anthropomorph from that used for the canopied cemí and 'Birdman'. The latter two carvings pre-date the period long considered the apogee of Taíno artistic and cultural florescence

Fig. 8. Small anthropomorphic cemí, *Guaiacum* sp., AD 1224–1282, Jamaica [5]. H: 395 mm (on stand); W: 207 mm (max); D: 56 mm. Courtesy, The Trustees of the British Museum, Am1997, Q.793.

Fig. 9. 'Birdman' (detail), *Guaiacum* sp., shell, resins; wood date: AD 1018–1152 (two dates combined, χ^2-Test: df = 1 T = 2.5 (5% 3.8)); resin date: AD 1466–1635, Carpenters Mountains, Jamaica [8]. H: 865 mm; W: 685 mm; D: 215 mm. Courtesy, The Trustees of the British Museum, Am1977, Q.2.

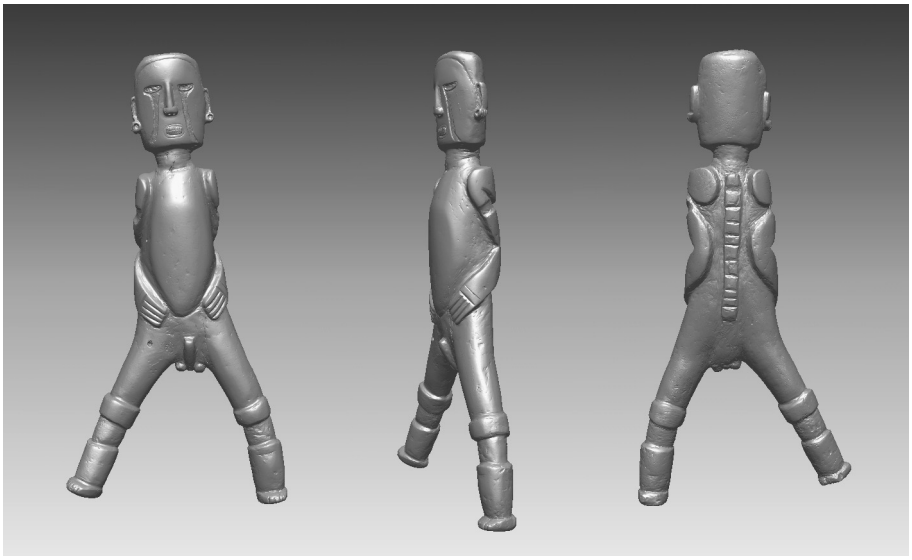

Fig. 10. Screenshots of the large Carpenters Mountains anthropomorphic cemí 3D computer model, *Guaiacum* sp., shell, resins; wood date: AD 1256–1382; resin date: AD 1426–1487, Carpenters Mountains, Jamaica [7]. H: 1050 mm; W: 490 mm; D: 145 mm. Images by Conservation Technologies, National Museums Liverpool, combined in Photoshop by Ostapkowicz. Courtesy, The Trustees of the British Museum, Am1977, Q.3.

Fig. 11. Cohoba stand, *Guaiacum* sp., resins; wood date: AD 1028–1156; resin date: AD 1416–1464, Carpenters Mountains, Jamaica [6]. H: 385 mm; W: 160 mm; D: 183 mm. Courtesy, The Trustees of the British Museum, Am1977, Q.1.

(post-AD 1200), showing a deeper history to the use of large-scale sculptural carving [8] and cohoba related paraphernalia [6]. In contrast, the anthropomorph's terminus wood date (AD 1256–1300, 91.6% probability) falls within the same period as the small male cemí [5] discussed above (AD 1224–1282).

Another aspect to the Carpenters Mountains pieces is their longevity, in the sense of their apparent curation and re-use by subsequent generations. Rather than being consistent with a single phase of manufacture, with overlapping dates for the outer wood and for the resin used to affix inlay in the eyes, mouth, etc., these carvings suggest a gap of decades if not centuries between the felling of the tree, and the last refurbishment of the inlays. In contrast to the gap seen in the wood dates, the resin dates suggest these pieces may have all been 'refreshed' with new inlays between AD 1416 [6.1] and 1487 [7.1], if not slightly later in the case of the 'Birdman' [8.1]. The supposition is that if they represent a 'set' in use at the same time, the likelihood is that their inlays were renewed at the same time – i.e., before 1487. Taking the end of the 91.6% probability distribution for the anthropomorph (AD 1300; [7.2]) as a terminus *ante quem* for the carving of the set, this potentially indicates a minimum of 120 years, or some five generations, of use for these pieces.

It is important to acknowledge here the possibility of carvers selecting previously felled, seasoned wood, which would impact on our understanding of manufacture dates, and on the notion of renewal. However, it seems more probable that recently felled wood would be chosen, being far easier to carve with stone and shell tools than seasoned tropical hardwoods, particularly in the case of woods such as *Guaiacum*, which have the potential to dry to an iron-like hardness (e.g., Lentz and Hockaday, 2009: 1345). Furthermore, the condition of some pieces in the wider corpus suggests that the Taíno used unseasoned woods, as evidenced in the presence of shrinkage, warping and radial cracks, indicative of post-carving changes. These changes are also consistent with juvenile wood, which tends to grow at a faster rate than mature wood and has generally thinner cell walls and shorter fibres, which consequently results in lower wood density and stiffness compared with mature wood (Lee Newsom, personal communication, 2013). Hence, juvenile wood may well have been easier to carve as compared to mature wood, especially with regard to a dense taxon like Guaiacum (Lee Newsom, pers com., 2013; Barnett and Jeronimidis, 2003; Haygreen and Bowyer, 1996; Hoardley, 2000).

Another key point to emerge here and in the wider corpus (Ostapkowicz et al., 2012a) is that where multiple dates for individual *Guaiacum* sp. carvings were obtained, they suggest that the trees selected were not as slow growing as originally assumed. The large Carpenters Mountains Anthropomorph [7] provides a pith date of AD 1227–1291 [7.4] and a terminus date of AD 1256–1300 [7.2] (91.6% probability): these results essentially overlap, suggesting a maximum of some 70 years growth for this branched section of tree, which is approximately 10 cm in width. This sculpture had sections of sapwood visible in areas of the upper surface, indicating that it was carved close to the outside of the bole. The Carpenters Mountains canopied cemí's results [6], taken from a wider section of wood (approximately 18 cm in width) indicate roughly 160 years of growth (pith: AD 994–1154 [6.3]; terminus: AD 1028–1156 [6.2]). The high degree of overlap between the pith and terminus dates for both carvings is notable, indicating, on the one hand, a good cross-reference between the dates, and on the other, a relatively short span of growth between the inner and outer wood (within the error ranges of the AMS dates, but distinguishable from them by their directionality – i.e., the pith dates are consistently younger than the sapwood dates). These results alongside others from the wider project have contributed to establishing a self-consistent model for the average growth rate of *Guaiacum* sp. boles selected for carving, with 1 cm of radial growth equivalent to 6–13 years (Brock et al., 2012). This compares favourably with the estimates of López-Toledo et al. (2008), of 8–14 years/cm for smaller trees or 10–13 years/cm for larger ones (diameters of >60 cm).

Of course, tree growth is entirely dependent on the quantity of sunlight and nutrients they absorb as they grow, and how much competition there is from neighbouring trees. Thus, even if it is assumed that the wood chosen for the carving was from a slow growing species, it would not be possible to predict whether a medium to large specimen would be decades or centuries old, as large size does not necessarily indicate a very long growth period. The multiple determinations on individual pieces were therefore highly informative not only in providing individual cross-checks for the dates, but also in determining that the 'old wood' problem did not impact the study to any significant extent (see Brock et al., 2012).

4.4. Unprovenanced (ca. AD 1200–1400)

An unusual bird-headed sculpture [9] (Fig. 12), which unfortunately lacks detailed provenance apart from an attribution to 'The Caribes' in the catalogue records (Joyce, 1907: 403), provided a determination of AD 1266–1297 [9.3]. The term Caribes (Spanish; Caribbees, English) has been, in the past, applied both to the Lesser Antilles, and to the Caribs (Kalinago), inhabitants of the Lesser Antilles – and there is the possibility that the carving comes from this region. However, this 19th century attribution should not be taken as literal – the term 'Carib' was also applied to the bird and turtle carving [2] (Joyce, 1907: 403), although its style is Taíno and its provenance Hispaniolan. Further, too little is currently known of the wood carving traditions of the Lesser Antilles to tie the bird head stylistically to the region.

The carving's $^{87}Sr/^{86}Sr$ value (0.70917) suggests that the tree had grown in a Quaternary limestone environment. This is broadly comparable to the values from some islands in the Lesser Antilles chain: such as Grande-Terre (0.70915), Marie-Galante (0.70917), Barbuda (0.70919) (mean values given by Laffoon et al., 2012).

Fig. 12. Bird head, *Guaiacum* sp., AD 1266–1297 (two dates combined, χ^2-Test: df = 1 T = 0.8 (5% 3.8)), 'The Caribes' [9]. H: 65 mm; W: 183 mm; D: 295 mm. Courtesy, The Trustees of the British Museum, Am.2159.

Conversely, it is also consistent with a number of other sources across the Caribbean, including parts of Hispaniola, the Bahamas and TCI – from where carvings with comparable values were sourced in the wider project. However, the bird head lacks the complex two-dimensional art that characterises Chican Ostionoid ceramics or contemporary 13th century wooden sculptures from Hispaniola, nor does it exhibit the elaborate designs seen on Bahamian or Turks and Caicos duhos. If it is from either one of these regions, it is a variant as yet unrecognised amidst the range of styles commonly associated with carvings from these areas.

There are, however, other intriguing possibilities: some of the carving's features – such as the cylindrical style of ears and the round, excavated eyes – are reminiscent of a wooden bird carving recovered from Hontoon Island, St. John's River, Florida, which is broadly contemporaneous with the Caribes bird head (its radiocarbon date, 650 ± 200 BP, has been repeatedly reported using its intercept date of AD 1300 [Bullen, 1958: 100; Milanich, 1994: 273; Purdy, 2007: 59], although the calibrated range actually spans AD 965–1666, 94.7% probability). Florida's eastern coastline, stretching the length of the state south to the Keys, is also comprised of Quaternary limestone bedrock, with $^{87}Sr/^{86}Sr$ values $\geq$0.7090 (Quinn et al., 2008:Fig. 2). *Guaiacum* sp., the wood used to carve this sculpture, is native to Florida. However, even taking these aspects together they do not necessarily point to a Floridan origin for the bird head: despite the frequent presence of bird iconography in Florida sculptures, the Hontoon 'owl' carving is highly stylised, and atypical of the often naturalistic bird carvings seen from such sites as Key Marco, Belle Glade and Fort Center (Purdy, 1991; Sears, 1994) – so the connection to Florida on stylistic grounds is tenuous, and the strontium results, at this stage, are inconclusive. The distribution of *Guaiacum* spans Florida, eastern Central America, the Caribbean, and northeastern South America – so the 'Caribes' provenance listed in the museum's records for this carving should be taken, at least at this stage, in its widest sense. Given the current provenance uncertainties, we must await further research in order to more firmly establish its origins, and therefore its cultural associations.

5. Conclusions

The study of Caribbean wooden carvings through AMS ^{14}C dating, material identification (wood, resin) and strontium isotope analysis, offers great potential to broaden our understanding of a group of artefacts that rarely survive archaeologically, and so have the potential to illuminate on a wide variety of issues that are, as a result, rarely explored – from people's past interactions with their environment (the trees selected) to their efforts in carving dense woods, still evident in the tool scars, to the care that they took to safeguard valued heirlooms that had resonance through the generations. Longer term trends, such as the persistence of a certain category of artefact over centuries (e.g., duhos), are now beginning to emerge. The results presented here contribute directly to the growing body of data (both chronological and material) on Taíno/Lucayan wooden sculpture (Ostapkowicz et al., 2012a).

The British Museum corpus is a key, representative collection reflecting the diversity of wood carving styles present in the Caribbean post-AD 1000, stretching from the northern Bahamas south to Jamaica. It provides us with the potential to explore the histories of artefacts that apparently came together as 'sets', such as the Carpenters Mountains group, as well as those that may reflect regional styles – such as the two anthropomorphic cemís from Jamaica. The stylistic parallels between these figures (e.g., hands on waist, outstretched legs carved from forked branches), together with their closely overlapping dates ([7.2]: AD 1256–1300 (91.6%); [5.1]: AD 1224–1282) and $^{87}Sr/^{86}Sr$ results ([7]: 0.70876; [5]: 0.70878) suggest that they could represent a regional style – perhaps the product of a specific village, or even the oeuvre of a single artist. The same can be suggested for the extended duho [4], which has close stylistic parallels to the duho in the St Louis Art Museum.

The results confirm that complex sculptures were in evidence earlier than the AD 1200 watershed that was thought to mark the florescence of Taíno art (Rouse, 1992: 123) – such as the 'Birdman' figure ([8.4] AD 1018–1152, combined date on sapwood), among the most strikingly innovative carvings to emerge from the pre-Hispanic Caribbean. Found together with the canopied cemí ([6.2] AD 1028–1156, terminus date), these sculptures hint at the central importance of wood carving to the smooth flow of key ceremonies such as cohoba – which had clearly developed into an elaborate stage for the display of prestigious, high-impact 'art' by this time. These carvings maintained their importance through the generations, potentially having their inlays refreshed at least two centuries later. This longevity hints at the histories they must have accrued over their long period of use, and their inherent value to each passing generation.

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