REVIEW ARTICLE

# The Pre-Columbian Caribbean: Colonization, Population Dispersal, and Island Adaptations

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Once considered a backwater of New World prehistory, the Caribbean has now emerged from the archaeological shadows as a critical region for answering a host of questions related to human population dispersal, Neotropical island adaptations, maritime subsistence, seafaring, island interaction networks, and the rise of social complexity, among many others. In this paper, I provide a review of: (1) what is currently known about the antiquity of Pre-Columbian colonization of the Caribbean using archaeological, biological, and oceanographic data; (2) how these data inform on the dispersal of what appear to be many different population movements through time; and (3) the subsequent adaptations (e.g., technological, subsistence, and economic) that took place across the islands after initial contact. Results of more than a century of research demonstrate that the Antilles were settled much earlier than once thought (ca. 7000 cal yr BP), in multiple waves that show strong linkages to South America, but possibly originated from more than one source location. Dispersal was patchy, with several intriguing chronological and spatial disparities that scholars are now investigating in more detail. Beginning ca. 2500 cal yr BP, and accelerating around 1500 cal yr BP, the frequent transport and exchange of goods, services, animals, plants, knowledge, and spiritual ideologies between the islands as well as mainland areas — particularly South America — testify to the interconnected nature of Pre-Columbian societies in the region. The use of more advanced analytical techniques, including ancient DNA, archaeobotany, stable isotopes, and various approaches to geochemical and mineralogical sourcing of artifacts, which until recently have been largely underused in the Caribbean, is opening new avenues of research that are creating exciting opportunities for examining ancient Amerindian lifeways.

**Keywords** migration, settlement, prehistoric, Antilles, West Indies, New World

## 1. Introduction

More than 20 years ago Keegan (1994, 255) remarked that "Caribbean archaeology [was] riding the wave of an exponential curve." He was referring primarily to growing interest in the region on an international scale, but also the move away from a long tradition of digging "telephone booths" to obtain decorated pieces of pottery and other artifacts with artistic value to help develop cultural historical models (vis-à-vis Rouse's (1960, 1972, 1986) typological frameworks). The trend, as Keegan (1994) noted, was a concerted and much needed movement toward more sophisticated approaches that examined aspects of sociopolitical organization, cultural evolution, mythology, cosmology, and island adaptations.

Keegan (1994) was absolutely correct in his perception that archaeology in the Caribbean was changing rapidly in response to a number of factors, including a steadily growing influx of new scholars over the last two decades. Given the region's intense and diverse colonial presence dating back more than 500 years that included the Portuguese, Spanish, French, Dutch, British, United States, and Denmark, it is not surprising that researchers from many different Caribbean islands and countries in Europe and the Americas have brought with them different backgrounds and varying notions of how to survey, excavate, and interpret archaeological sites and the assemblages found within. Despite the scholarly transformations that have taken place over the last 20 years, it is only relatively recently that the Caribbean has become more recognizable and engaged with the international community and come closer to catching up theoretically and methodologically with other major island regions.[1]

In this paper, I provide a review of Pre-Columbian[2] archaeology in the Caribbean, especially as it pertains to: (1) what is currently known about early evidence for colonization of the Antillean chain of islands; (2) some of the theoretical debates about where these first peoples may have originated based on archaeological,

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biological, and oceanographic data; (3) subsequent adaptations to newly encountered island environments that led to changing subsistence practices, extirpations, and extinctions of various animals, intricate exchange systems, and the rise of social complexity; and (4) how ancient Amerindian groups dispersed and moved between different islands and mainland areas as evidenced through artifact distribution, animal translocations, iconography, and other lines of evidence. Overall, the compendium of data deriving from archaeological and related research in the last two decades (e.g., see Keegan 2000; Perrot-Minnot 2015; Wilson 2007), particularly with advancements in various analytical techniques (e.g., ancient DNA (aDNA), light and heavy stable isotope analyses), has pushed back in time the antiquity of colonization (though numerous chronological gaps or discrepancies still exist) and demonstrated a much greater complexity of daily life (economically, politically, spiritually, and horticulturally) for Amerindian groups than was previously thought. Significant gaps in our knowledge of past Amerindian lifeways still exist, however, that require concentrated efforts to resolve.

## 2. Geographical and environmental background

The Caribbean is one of the world's largest seas at roughly 2.75 million $km^2$ in area, comparable in size to the Mediterranean (Figure 1). It is bordered to the north and east by the Antilles chain of islands, to the west by the Yucatán and parts of Central America, and to the south by the Isthmo-Colombian region and northern South America. There are dozens of islands in the Caribbean that are generally categorized into three major groups: the Greater Antilles, which include Cuba, Hispaniola, Jamaica, and Puerto Rico; the Lesser Antilles that stretch for 950 km in a gently curving arc from Grenada in the south to the Virgin Islands in the north; and the Bahamian Archipelago that is technically within the Atlantic Ocean, but was settled prehistorically by Amerindians and so are often grouped culturally with the rest of the Antilles. There are numerous other islands that do not readily fit into these major categories. These include the small limestone Cayman Islands that lie about 150 km southwest of Hispaniola; Trinidad, Tobago, Margarita, Los Roques, Aruba, Curaçao, and Bonaire that skirt northern Venezuela; and a number of smaller islands that generally fringe the eastern coasts of Mexico and Central America such as (from north to south) Cozumel, the Turneffe islands and numerous cays off the coast of Belize, the Bay islands of Honduras, Cayos Miskitos near Nicaragua, the Bocas del Toro archipelago and San Blas islands off the coast of Panama, and San Andres and Providencia that lie between the Colombian Basin and Nicaragua Rise. Much of the Antilles is also divided into sub-regions known as the "Leeward" or "Windward" islands. The first generally refers to those that are situated east of Puerto Rico down to Dominica, while the second includes those islands south of Dominica to Trinidad and those situated along the coastal margins of South America (e.g., Margarita, Bonaire). In total, the Caribbean islands have a land area of around 230,000 $km^2$, though nearly half of that (111,000 $km^2$) is taken up by Cuba and another 76,500 $km^2$ by Hispaniola (82 per cent in total), testifying to the great number of smaller islands found in the region.

Geologically, the Greater Antilles are complex with mixed lithologies that date back to the Cretaceous-Paleogene. Some evidence suggests that these islands (or major portions of them, with the exception of Jamaica), along with the Virgin Islands, were part of the same arc system (Pindell and Barrett 1990, 414). Jamaica is an extension of the Nicaraguan Rise and is separated from Cuba and the Cayman Islands by the Cayman Trough, the deepest ocean trench in the Caribbean Sea that reaches more than 7600 m (25,000 ft) in depth.[3] The Lesser Antilles arc extends for about 750 km from Anguilla and Sombrero south to Grenada and includes Saba and the Limestone Caribbees. This island arc system developed from the subduction of the North American Plate beneath the Caribbean Plate's eastern edge (e.g., Speed et al. 1993), with several other minor arc regions identified within the chain. The relatively young geological age of the Lesser Antilles is evident in the high mountainous peaks and frequent volcanic activity seen over the last 10,000 years, in which more than 20 volcanos are known to have erupted, including historic ones on Montserrat (1995, 1997, 2008, and 2010) and St. Vincent (1902–1903, 1979) that killed and displaced thousands of people (see Lindsay et al. 2005; Sigurdsson and Carey 1991). The pre-middle Eocene aged formations of most of the islands (e.g., Bonaire, Aruba, Curaçao, and Los Roques) that flank the northern South American littoral are remnants of an exposed, mostly submarine ridge, also suggestive of an island arc system (see Hippolyte and Mann 2011).

The region's climatic regime is tropical and fairly stable, with some seasonal variation in temperature and rainfall. The Caribbean is generally more humid and hot in the summer and fall months, with prevailing easterly winds averaging between 11 and 15 knots, though there are seasonal and geographic deviations (see Callaghan 2001, 2011). Oceanographic patterns are dominated by the Caribbean Current that moves westward through the southern Lesser Antilles, curves northward between Mexico and Cuba forming the Yucatán Current, enters the Gulf of Mexico, transitions into the Loop Current that flows north and then east, and moves between the


**Figure 1 Map of the Caribbean showing major population dispersals and some of the ceramic style zones referred to in the paper (drafted by Scott M. Fitzpatrick and Joshua L. Keene). Dates in bold (in calendar years before present) indicate earliest known dates or date ranges (in cal yr BP) for the settlement of particular areas or islands in the region.**

Florida Keys and Cuba as part of the Florida Current. The currents finally discharge out into the Atlantic as part of the swift moving Gulf Stream that averages 4 miles/hour (6.4 km/hour), but with surface speeds that can reach up to 5.5 miles/hour (9 km/hour), the fastest in the world. It is so powerful, in fact, that it moves as much water (four billion cubic feet of water per second) as all of the world's rivers combined.

The Caribbean is an ecologically diverse region with a disproportionate number of endemic plant and animal species in relation to land area. For example, around half of the 13,000 known plant species are single-island endemics, with one family and more than 200 genera found only in the Caribbean. Over 25 per cent of the 600+ known bird species, almost half of the 90 mammal species, many reptiles, nearly all of the 500 amphibians, and all 170 or so species of frogs are endemic (see Crother 1999). The sheer number of marine taxa found — from the 1500 fish species (Humman and DeLoach 2003; Lieske and Myers 2001), 630+ mollusks (Warmke and Abbott 1962) and 25 coral genera, to an amazing array of crustaceans, sponges, and echinoderms — are also indicative of the region's high level of biodiversity (Mumby et al. 2007), something that both prehistoric settlers and those who came after were well aware of.

## 3. First Antillean Landfall (ca. 7000–5500 cal yr BP)

It is widely known that the first island in the Caribbean to be settled prehistorically was Trinidad between ca. 8000 and 7800 cal yr BP (Table 1).[4] Evidence from the sites of Banwari Trace and St. John shows a diverse artifactual assemblage of bone and flaked and ground stone tools with exploitation of marine, freshwater, and terrestrial environments (Boomert 2000). It is important to note, however, that the island was connected to the South American mainland during the early Holocene, which makes the colonization history of Trinidad much different than the Antillean chain in that initial settlement would not have required watercraft. Similarities to sites on the mainland are quite apparent and can be seen in shell middens from northwest Guyana known as the Alaka complex (see Boomert 2000, 68–74; Evans and Meggers 1960) where stone tool manufacturing involved bipolar processing and ground stone

**Table 1**
**Earliest dates (median) and land area ($km^2$) for major islands in the Caribbean, including initial colonization and Ceramic Age settlement, if different***

| Island | Earliest colonization (cal yr BP) | Earliest Ceramic Age colonization (cal yr BP) | Area ($km^2$) |
|---|---|---|---|
| Abaco (Bahamas) | 950 | 950 | 1,224.1 |
| Anegada | — | 845 | 38 |
| Anguilla | 3620 | 1440 | 73.7 |
| Antigua | 4950 | 2040 | 277 |
| Aruba | 3640 | 2055 | 181.1 |
| Baliceaux | 565 | 565 | 1.8 |
| Barbados | 5060 | 1490 | 462.4 |
| Barbuda | 3850 | — | 163.3 |
| Carriacou | 1460 | 1460 | 35 |
| Cuba | 7250 | 4000/1565 | 105,805.5 |
| Culebra | — | 1345 | 29.3 |
| Curacao | 5103 | 1370 | 443.1 |
| Dominica | — | ca. 2400 | 787.3 |
| Eleuthera (Bahamas) | 1040 | 1040 | 457.4 |
| Grand Turk (Turks and Caicos) | 1050 | 1050 | 18 |
| Grenada | 1850 | 1850 | 322.7 |
| Guadeloupe (Grand and Basse Terre) | 3375 | 1920 | 1,547.7 |
| Hispaniola | 6350 | 1350 | 74,546.10 |
| Isla de la Juventud | 1015 | 1015 | 2,237.3 |
| Jamaica | 1185 | 1185 | 11,025.90 |
| Long Cay (Turks and Caicos) | 950 | 950 | 1 |
| Margarita | 4000 | — | 956.8 |
| Marie-Galante | — | 1485 | 170.5 |
| Martinique | 3710 | 1605 | 1,166.6 |
| Middle Caicos (Turks and Caicos) | 870 | 870 | 430 |
| Middleton Cay (Turks and Caicos) | 800 | 800 | 0.08 |
| Mona | 4955 | ca. 800 | 58.1 |
| Montserrat | 2450 | 2450 | 104 |
| Mustique | 1705 | 1705 | 6.7 |
| Nevis | 2700 | 2450 | 92.3 |
| New Providence (Bahamas) | 1150 | 1150 | 227.8 |
| Puerto Rico | 6855 | 2445 | 8,761.1 |
| Saba | 3660 | 1555 | 13 |
| St. Lucia | 1395 | 1395 | 639.8 |
| San Salvador (Bahamas) | 1150 | 1150 | 162.3 |
| St. Eustatius | — | 1640 | 21 |
| St. Kitts | 4100 | ca. 2400 | 170.8 |
| St. Martin | 5125 | 2350 | 91.9 |
| St. Thomas | 3035 | 1790 | 69.7 |
| St. Vincent | 1650 | 1650 | 352.7 |
| Tobago | 2950 | 1480 | 308.8 |
| Trinidad | 8170 | 1905 | 5,008.7 |
| Union | 1025 | 1025 | 9.4 |
| Vieques | 4050 | 2450 | 147.9 |

*Dates absent for some islands during the Ceramic Age are not necessarily indicative of a lack of settlement, but supportive radiocarbon chronologies may not be available. Other islands such as Cuba appear to have sites with ceramics that pre-date the Ceramic Age, but are technically Archaic. Some dates are estimates and will likely change as additional chronometric hygiene procedures are implemented (see Fitzpatrick 2006; also Cooper 2010; Rodríguez Ramos et al. 2010; Giovas and Fitzpatrick 2014).

technology, for example. The same can be said for the El Conchero complex along coastal Venezuela east of the Gulf of Paria, with shell middens containing stone tools (e.g., hammerstones, pestles, and mortars) and food remains comparable to both Banwari Trace and Alaka complex sites (Boomert 2000, 73; Cruxent and Rouse 1982). The descriptor widely used for these aceramic sites on Trinidad and Tobago has been "Ortoiroid" named after the Ortoire site on Trinidad (Rouse 1992), though it actually dates much later than Banwari Trace (ca. 3700–3000 cal yr BP). Most aceramic sites on these two islands were classified by Boomert (2000, 54–55) as Banwarian Ortoiroid based primarily on their small size (<1 ha), presence of stone tools, and harvesting of nearshore marine resources.

The first colonization of the Antilles proper probably occurred sometime between ca. 7000 and 5500 cal yr BP, though the ephemeral nature and poor chronological resolution make pinpointing a more exact time quite difficult. The earliest known archaeological sites have been found in Cuba and Hispaniola and date roughly between 6000 and 2500 cal yr BP (Cooper 2010; Rodríguez Ramos et al. 2010).[5] These are often attributed to the "Lithic Age" and designated by Rouse (1986, 1992) as Casimiroid[6] after the Casimira site on Hispaniola.[7] These sites have typically been classified based on the absence of ground

stone tools with assemblages that include "unretouched macroblades struck from prismatic cores" (Keegan 1994, 264) that were probably used for a variety of activities such as wood working, butchering and processing animals, and making other tools (Veloz Maggiolo 1991). There is emerging evidence, however, that these Casimiroid groups were creating more sophisticated tools that involved flaking stone followed by pecking and grinding, possibly hunted sloths (Steadman et al. 2005) and manatees, and produced stone and shell ornaments (Reid 2009). Subsistence remains from this time period are not well described, but Veloz Maggiolo and Vega (1982) suggest that they were primarily foragers of both marine (mostly mollusks) and smaller terrestrial animals (e.g., iguanas, rodents) based on form, function, and use-wear patterns of the lithic assemblages.

Some of the earliest substantive work on Casimiroid sites were conducted in Cuba by the Polish archaeologist Kosłowski (1974). Following in the footsteps of Cuban scholars, including Ernesto Tabío, Kosłowski continued the work of archaeologists from the Academia de Ciencias de Cuba at the rockshelter site of Levisa I in northeastern Cuba that dates back to between ca. 6300 and 5700 cal yr BP. In his examination of artifactual assemblages from the site, he noted a decrease in blade tools with a commensurate increase in flake tools and a propensity through time for shell tools made from queen conch. While many Casimiroid era sites are simple lithic scatters or workshops, the Levisa I site contains an interesting and rich faunal assemblage that suggests an early reliance on larger animals, including manatees, sea turtles, and the now extinct Caribbean monk seal (*Monachus tropicalis*), with little to no contribution of fish or mollusks (Wilson 2007, 34–35).

It is not entirely clear from where these first Lithic Age colonists originated from, though a few scholars suggest it was from somewhere in Mesoamerica based primarily on similarities in lithic technologies (e.g., Rouse 1992, 69; Wilson et al. 1998). The data are quite fugacious though, with Callaghan (2003) suggesting that there are more dissimilarities between artifacts in the assemblages than not. Wilson (2007) argues that the Yucatán may still have been the most likely departure point given the presence of large macroblades found at the sites of Colha, Ladyville, and Sand Hill in Belize, which are generally rare for the sites and time frame involved (between ca. 9500 and 5000 cal yr BP) (Wilson 2007, 32–33). Currently, there is a dearth of $^{14}$C dates that reach back to the earliest stages of Lithic Age settlement. Both skeletal and genetic data are also scant that would help ascertain the origin(s) of these groups.

It has long been thought that the next major population dispersal into the Caribbean also occurred around a similar time as the entry of Casimiroid peoples and that they represented a separate group of preceramic colonists. These sites, which are considered to be part of the Archaic Age, may date to as early as 6000–5000 cal yr BP (Cooper 2010), with some dating to as late as 2500 cal yr BP or slightly after. The origin of these Archaic groups is likely rooted in South America, with archaeobotanical evidence of plants coming into the Caribbean from the mainland (Pagán-Jiménez et al. 2015) and seafaring simulations showing a probable departure point from somewhere along northern Colombia and/or Venezuela (Callaghan 2003).

To date, there have been no successful extractions of aDNA from Archaic Age (pre-2500 cal yr BP) human remains in the Caribbean, with the possible exception of specimens analyzed by Lalueza-Fox et al. (2003) who sequenced mtDNA from bone and tooth samples from several sites in western Cuba affiliated with "Ciboney"[8] populations, thought to have been relic groups of hunter–gatherers ancestral to the first peoples who colonized the Caribbean. None of the samples were directly dated, although the sites ranged in age from ca. 4700 to 1500 cal yr BP.[9] Results showed that there were three haplogroups present in the 47 individuals analyzed: haplogroup A, but in a very small percentage (0.07), C (0.60), and D (0.33). Based on these findings, the authors noted that:

> different phylogenetic analyses [based on Archaic and Ceramic Age Ciboney samples from Cuba] seem to suggest that the Caribbean was most likely originally populated from South America, although the data are still inconclusive, and Central America influences cannot be discarded [and we hypothesize] that the colonization of the Caribbean mainly took place in successive migration movements that emanated from the same area in South America, around the Lower Orinoco Valley. (Lalueza-Fox et al. 2003, 97)

These results are somewhat coarse, though, having been done prior to newly developed techniques such as next generation sequencing (Knapp and Hofreiter 2010). More advanced analytical procedures to retrieve and sequence aDNA will surely refine and illuminate our understanding of where these and other Caribbean populations originated from.

Archaic Age sites are found in Cuba, Hispaniola, Puerto Rico, and many of the islands in the northern Lesser Antilles, including Anguilla (Crock et al. 1995), Antigua (Davis 2000), Barbuda (Watters et al. 1992), Nevis (Wilson et al. 1998), Saba (Hofman et al. 2006), St. Kitts (Armstrong 1980), St. Maarten (Bonnissent 2008; Hofman and Hoogland 1999), and St. Thomas (Figueredo 1976; Lundberg 1989, 34) (Table 1). It is worth noting that the majority of islands in the

Lesser Antilles have only a small number of sites (usually one or two) dating to this time period. The exception is Antigua, which has more than 40 Archaic sites recorded, much of it by Desmond Nicholson (1994), the former director of the Museum of Antigua and Barbuda. The high density of sites on Antigua is largely due to the tool-quality chert (known as Long Island flint) found almost exclusively at Flinty Bay on the small offshore island of Long Island (though other chert sources are known on the Antiguan mainland), which was then brought and/or traded widely to other islands in the region (Davis 2000; Watters 1997, 89–92; Wilson 2007, 51–52). Here, peoples were practicing a lithic technology that involved taking prepared cores and striking blades off (Davis 2000), similar to what is seen in very early sites in the Greater Antilles thought by Wilson et al. (1998) to originate from Central America. However, Boomert (2000, 79) has argued that the lithics are more representative of the Alaka complex on the South American mainland given that they were also using percussion flaking.

Anomalously, there have been no Pre-Columbian sites that date earlier than about 1400 cal yr BP found in Jamaica or the Bahamas, two relatively large land masses that lie in close proximity (ca. 100–150 km) to Cuba and Hispaniola. In the case of Jamaica, Callaghan (2008) suggests that rough sea conditions may have dissuaded settlement until much later when canoe technologies improved. There is also the possibility that earlier sites in both locations have eluded discovery due to the drowning of coastal areas from rising sea level. It remains, however, that there are few islands in the world as large as Jamaica (nearly 11,000 $km^2$ or 4240 sq. miles) which were reasonably close to other larger land masses but that remained undiscovered for millennia. Some exceptions are found in the Mediterranean. For example, Sardinia has sites dating to the Upper Palaeolithic, but Corsica to the near north has only Mesolithic sites, millennia behind its bigger southern neighbor. The Balearics were also settled extremely late (Majorca ca. 2200 cal yr BP and Menorca probably around 1900 cal yr BP) (see Broodbank 2006; Dawson 2014). Given the milieu of conditions (environmental, social, technological, and oceanographic) that are needed to precede first colonization of any island, Jamaica and the Bahamas are not necessarily unique in this regard.

Interestingly, Barbados is the only island south of the Guadeloupe Passage known to have a secure Archaic Age component, making the southern Lesser Antilles also unusual in terms of early settlement. The Heywoods site, identified and excavated by Drewett (2007), has Archaic style chipped shell adzes dating back to between ca. 5000 and 4000 cal yr BP (Fitzpatrick 2011), making this site coeval with the earliest dates in the northern Lesser Antilles. It is presently unclear why there are virtually no Archaic sites in the southern Caribbean, though Callaghan (2010) has suggested that it was not related to oceanographic conditions, deficiencies in seafaring, volcanism (which is prevalent during the mid to late Holocene), or the destruction or poor visibility of sites. Instead, he suggests that there may have been an element of fear or belief systems that discouraged settlement. That Barbados is almost entirely limestone and lacks the typical topography and geological instability characteristic of emerging volcanic islands suggests that there may be some substance to the notion that cultural attitudes (e.g., avoiding potential volcanic eruptions and associated seismic activity, tsunamis, etc.) dissuaded occupation until much later in time. Barbados is also much more difficult to reach given the prevailing winds and currents that move in a westerly direction. Remarkably, Barbados was the only island in the Caribbean never to change hands between European powers after it was colonized by the British in the early 1600s, despite several attempts by the French and Dutch to do so. This is a clear testament to the difficulties of navigating and maneuvering even larger sailing ships in the region given the region's dominant oceanographic and anemological effects (Fitzpatrick 2013a).

In terms of assemblages, Archaic Age sites are typically located along coastal areas with shell middens comprising a narrow range of species (usually 10 or less) and lithic debris. While it was once thought that these groups were nomadic foragers that lacked pottery and horticulture, it is becoming increasingly recognized that they were much more sedentary and complex than once thought. Archaeobotanical remains, for example, show the presence of cultivated plants, including yellow sapote (*Pouteria campechiana*), wild fig (*Ficus* sp.), primrose (*Oenothera* sp.), West Indian cherry (*Malphigia* sp.), zamia (*Zamia debilis*), trianthema (*Trianthema portulaca*), and sapodilla (*Manilkara* [*zapota*] sp.), among others (see Newsom and Wing 2004). The latter is not native to the Caribbean, which implies some type of movement and management (Liogier and Martorell 2000). At the site of Canímar Abajo in Cuba, researchers recently identified the earliest use of cultigens on the island, with evidence of peoples cultivating beans (*Phaseolus vulgaris*) and also consuming wild plants found locally as early as 3000 cal yr BP (Chinique de Armas et al. 2015). The intriguing site of Plum Piece on the small island of Saba shows an inland exploitation of a few select resources ca. 3000 cal yr BP — primarily Audubon's shearwater (*Puffinis lherminieri lherminierii*) and land crabs (*Gecarcinus ruricola*) — testifying to broader scale seasonal foraging in heavily forested areas (Hofman et al. 2006).

New excavations in the Greater Antilles, coupled with a re-evaluation of existing pottery assemblages, has demonstrated that Archaic groups were also not aceramic as once thought. Both Keegan (2006) and Rodríguez Ramos et al. (2008) have illustrated that there was a "Pre-Arawak" pottery horizon prior to the arrival of later Saladoid peoples ca. 2500 cal yr BP (see discussion below), those who were first thought to have brought ceramic manufacturing technology to the West Indies. Keegan (2006) has even gone so far as to suggest that the Ostionoid style of pottery, which was first thought to have entered islands west of Puerto Rico after 1500 cal yr BP, was actually an indigenous development that derived out of Archaic ceramic traditions. These ceramic traditions are discussed in the following section.

## 4. Early Ceramic Age (ca. 2500–1500 cal yr BP)

The beginning of what is widely referred to in the West Indies as the "Ceramic Age" occurs around 2500 cal yr BP and spans nearly the entire eastern Caribbean, from Puerto Rico in the north, down through the Lesser Antilles to Grenada in the south, across to Trinidad and Tobago, and into the Middle and Lower Orinoco River basin of Venezuela. This population dispersal was relatively rapid and involved a cultural complex known as Saladoid named after the type site of Saladero in Venezuela where it was first identified. The term Saladoid was defined as a cultural "series" more than 50 years ago by Cruxent and Rouse (1958/59) and replaced the term "Arawak" as the designation for what were thought to be the first ceramic making peoples to enter the Antilles. Saladoid is subdivided even further into other major categories: the early Ronquinan cultural complex found on mainland South America, possibly dating to as early as 2800–2650 cal yr BP; Cedrosan found in coastal and island settings dating to between 2200 and 1700 cal yr BP; and the Huecoid (Huecan Saladoid) that dates slightly later and is found in Puerto Rico and the northern Lesser Antilles. There is considerable debate as to the antiquity of Saladoid groups on different islands generally and their degree of cultural overlap through time. Keegan (2004) addressed this issue, noting that we should be cautious in assuming that all archaeological signatures of a Saladoid presence (e.g., pottery) were contemporaneous, given evidence demonstrating that some elements persisted on some sites and islands later than others.

Up until relatively recently, it has generally been assumed that Saladoid groups first originated along the Orinoco River basin of Venezuela, ventured into the coastal margins of northern South America, and then moved in a stepping-stone fashion northward from Trinidad through the Lesser Antilles beginning around ca. 2500 cal yr BP, eventually reaching Puerto Rico before stopping. From a biogeographical perspective this made sense, given that the earliest insular Saladoid dates derived from sites such as Palo Seco and Cedros in Trinidad (Boomert 2000), with contemporaneous dates in the north from numerous sites in Puerto Rico and the Leeward islands. However, current radiocarbon chronologies indicate that the southern Lesser Antilles south of Guadeloupe were settled centuries later (e.g., Fitzpatrick 2006), suggesting that initial population movements during the Ceramic Age, mirroring what is seen during the Archaic Age, may have initially bypassed the southern region. This has been termed the "Southward Route Hypothesis" and could be explained by oceanographic and anemological effects that influenced canoe travel. This was demonstrated by seafaring simulations conducted by Callaghan (2001), who noted that the channels between the islands act as bottlenecks for the swift currents moving westward from the Atlantic, and that drifting or paddling between South America and the northern Caribbean can be managed in a matter of a week or so relatively easily (see also Fitzpatrick 2013a, 2013b). To date, there has been no successful attempt to sequence aDNA from Saladoid-era remains. Nonetheless, the expansion of these groups appears to have largely taken place between 2200 and 1900 cal yr BP from somewhere along the northern South American littoral, with a larger number of sites and islands occupied during this interval.

While some of these Saladoid dispersals led to islands that were already occupied by Archaic groups, others were colonized for the first time, including all of those south of the Guadaloupe Passage except for Barbados (Drewett 2007; Fitzpatrick 2011). The vast majority of early Ceramic Age sites are located along the coast. Many of these sites were initially thought to have been focused on the northern and eastern sides of the islands (which would have presumably allowed peoples to take advantage of the cooling trade winds), but that also offered opportunities to intensively harvest both terrestrial and marine resources in close proximity to arable land. Callaghan's (2007) research on St. Vincent, for example, demonstrates local variation to this general pattern, however, with preferred locations for settlement on the island over the last two millennia focused on low-lying coastal areas in cactus scrub or secondary rainforest with a preference for the southwest (leeward) part of the island. Continued research across the Antilles demonstrates that a wide variety of habitats were exploited, with inland areas also occupied, especially those adjacent to major riverine systems to ensure access to freshwater sources. Saladoid villages were typically constructed in a concentric circular arrangement (Siegel 1996) with a

central plaza occasionally used for burying the dead as exemplified by the Maisabel site in Puerto Rico (Siegel 1989). All of these characteristics are reminiscent of what is found with groups in northern South America and reflective of a shared cosmology that stressed different spiritual and earthly realms as part of their *axis mundi* (cosmic or world axis) (Curet and Oliver 1998; Oliver 1997; Siegel 2010).

Saladoid peoples are well known for their beautifully constructed, thin, and well-fired ceramics. The pottery during this time is primarily made from local clays (though evidence suggests that some were imported) (Hofman et al. 2007), and is dominated by Cedrosan Saladoid varieties with zone-incised cross-hatch and polychromic slip designs such as white-on-red and La Hueca (Huecan Saladoid), with fine line rectilinear or curvilineal incision (see Petersen et al. 2004). In some sites, these two types are found together, while at others they are not (Bérard 2013, 185; Curet et al. 2004). Modeled adornos in the shape of humans or animals, often used as handles for bowls and vessels, along with rim punctate pellets, are also common features of their ceramic design (Bérard 2013). A wide variety of vessel shapes and sizes were produced, including griddles for baking cassava (manioc) bread and presumably other foods, unrestricted bowls and pots, carinated versions (sometimes with an inverted bell-shaped form), and a host of other types. Later in time, ca. 1600 cal yr BP, there appears to be both internal and external influences on island Saladoid populations. The latter is related to Barrancoid expansion in the Orinoco, Trinidad, and Tobago (Boomert 2000) that manifested itself in ceramic manufacture and decoration, with thicker walls, round and triangular shaped rims, large loop strap handles, and new vessel forms, including zoomorphic effigy pots and "hammock" or navicular bowls (Bérard 2013, 190; Petersen et al. 2004).


**Figure 2 Petroglyphs found in Grenada at the base of or adjacent to freshwater sources (photos by Scott M. Fitzpatrick).**

Despite the ubiquity of ceramics, it is evident that lithic materials were still important, if not critical to the sociopolitical development of Ceramic Age societies. This is demonstrated by an abundance of data, ranging from the strategic positioning of settlements near lithic sources to the continued exploitation of Long Island flint from Antigua and a microlapidary tradition for making beads and other objects that involved more than two dozen different types of semi-precious stones and minerals such as jadeite/jadeitite, serpentinite, diorite, carnelian, amethyst, peridotite, and olivine (Knippenberg 2007). These are restricted to particular islands or locales and visibly demonstrate the importance that these materials had for Amerindian groups through time (Hofman et al. 2007, 249–250; Knippenberg 2007). *Guanín*, a gold-copper alloy also known as *tumbaga* in Central America, is found in Early Ceramic Age deposits on Puerto Rico at the Maisabel site dating to ca. 1900 cal yr BP (Siegel and Severin 1993) and Vieques at the La Hueca site (Chanlatte Baik 1981). This material was hammered into ornaments and inlays (Oliver 2000), and because it is not found locally in the Caribbean islands, must have been occasionally imported, possibly from northern Venezuela or further west in the Isthmo-Colombian region. This area, that stretches from western Venezuela up to Nicaragua, seems to have influenced northern Caribbean societies in a number of ways, exemplified in part by Huecoid ornitomorphic pendants resembling Andean condors along with other personal adornments in the form of frogs along with drilled jaguar and peccary teeth, for example, that are similar in style to that found on the mainland (Rodríguez Ramos 2013). Rock art also becomes commonplace during the Ceramic Age, with a diverse assortment of petroglyphs and pictographs with zoomorphic, geometric, and anthropomorphic designs. Many are located near freshwater sources (Figure 2), at the entrances to caves, and on stones that line *batéys* (plazas/ballcourts) (Hayward et al. 2013).

In addition to the many other political, spiritual, and ideological aspects of Saladoid expansion that linked these groups to South America, there was a heavy focus on horticulture and the introduction of non-native plants and animals. Newsom and Wing (2004) provide a detailed review of the extensive

variety of biota that were harvested by ancient Caribbean Amerindians, which in terms of animals, was largely marine based. While it was once thought that very few plants were cultivated prehistorically, with manioc (*Manihot esculenta*) being the primary staple, new research on micro- and macrobotanical remains recovered from artifacts and dental calculus is highlighting the breadth and intensity of horticultural practices. Continued research has demonstrated the presence of numerous starch grains, tubers, and legumes, including maize (*Zea mays*), sweet potato (*Ipomoea batatas*), marunguey (*Zamia* spp.), cocoyam (*Xanthosoma* sp.), peanut (*Arachis hypogaea*), and the common bean (*Phaseolus vulgaris*) (see Mickleburgh and Pagán-Jiménez 2012; Newsom and Wing 2004, 154; Pagán-Jiménez 2013). Interestingly, the archaeobotanical evidence for manioc cultivation is exceedingly rare.

In regards to maize (once thought to have been minimally or never present in the Caribbean), new research is now pushing back the antiquity of this and many other cultivars as well as non-domesticated plant varieties in both northern South America and the Caribbean. The recovery of starch grains on millingstone bases and conical pestles recovered from the sites of St. John on Trinidad and Eva 2 in French Guiana suggest that maize was present in the former by around 7800 cal yr BP and the latter by ca. 6000 cal yr BP (Pagán-Jiménez et al. 2015). Several other plants were also identified on these stone artifacts, including chili pepper, jackbean (*Canavalia* spp.), wild yam (Dioscoreaceae), achira (*Canna* spp.), wild *marunguey*, and chili pepper (*Capsicum* spp.).

While most of the introduced plant species were for consumption, the discovery of ceramic snuffing tubes and inhaling bowls on at least 10 different islands (Kaye 2010), which were used to ingest the hallucinogen *cohoba* (derived from the seeds of the South American plant *Anadenanthera peregrina*), may also have accompanied Saladoid groups. While microbotanical evidence of *cohoba* starch grains found on a coral milling base from Puerto Rico dates to the Late Ceramic Age between 800 and 900 cal yr BP (Pagán-Jiménez and Carlson 2014), several inhaling bowl fragments from the small island of Carriacou in the southern Grenadines, dated by thermoluminescence and optical stimulating luminescence to a weighted average of 2350 ± 190 cal yr BP in deposits that date much later to ca. 1000–800 cal yr BP, suggest this psychoactive was introduced even earlier, and that the paraphernalia used for ingestion were kept as heirlooms (Fitzpatrick et al. 2009). Overall, the archaeobotanical and artifactual evidence testifies to the importance of many different plants for nutritional, pharmacological, and psychoactive properties in the ancient Caribbean.

As with many islands, terrestrial fauna tends to be depauperate compared to continental areas, and the Caribbean is no exception. As a result, much of the protein needed by humans to survive derived from the sea, though native land crabs (Gecarcinidae), amphibians, sea birds, snakes, lizards (e.g., Ameiva, Iguanidae), and the now extinct rice rat (Tribe Oryzomyini) (e.g., Turvey et al. 2010, 2012) were also widely exploited (see Newsom and Wing 2004). While fishing and mollusk gathering practices varied between islands, zooarchaeological composition of midden deposits (Carder et al. 2007; LeFebvre 2007; Wing 2001; Wing and Wing 2001) and stable isotope analysis from human bone (e.g., Buhay et al. 2013; Keegan and DeNiro 1988; Krigbaum et al. 2013; Pestle 2013) demonstrate quite clearly the importance that marine foods (mostly finfish and mollusks) had to Caribbean populations from the time of initial settlement to European contact (Grouard 2010; Newsom and Wing 2004; Serrand 2008). These included sea turtles (Cheloniidae), both pelagic and nearshore fishes such as tuna (Scombridae), flying fish (Exocoetidae), groupers (Serranidae), snappers (Lutjanidae), parrotfishes (Scaridae), wrasses (Labridae), and grunts (Haemulidae). Dozens of mollusk species, primarily gastropods, were also exploited, the most important of which were queen conch (*Lobatus* [*Eustrombus*/*Strombus*] *gigas*) both for food and making tools and other artifacts (Figure 3). Other important mollusk species included the West Indian topsnail (*Cittarium pica*), star shells (*Lithopoma* spp.; e.g., *L. tuber*, *L. caelatum*), nerites (Neritidae), and occasionally cone shells (*Conus* sp.) along with bivalves such as the tiger lucine (*Codakia oribicularis*), coquina clams (*Donax* spp.), ark clams (Arcidae; e.g., *Anadara* sp. and *Arca* sp.) and *Chama* sp. Other marine foods such as chitons (Polyplacaphora) and sea urchins (Echinoidea) were also targeted, with a smaller contribution from crustaceans (e.g., lobsters). Curiously, there is a distinct lack of good evidence for the harvesting of larger mammals known to have frequented the region, including numerous species of cetaceans (i.e., whales, dolphins, and porpoises), the Caribbean monk seal (*Monachus tropicalis*, driven to extinction in the mid-20th century), and the West Indian manatee (*Trichechus manatus*). A drilled monk seal tooth was found at the Tutu site in St. Thomas (Righter 1997, 74), however, and some sites such as Dizac and Macabou on Martinique show evidence for hunting manatees, but in low numbers (Grouard 2013). Nevertheless, archaeological evidence and ethnohistorical accounts demonstrate that the harvesting of mollusks coupled with fishing were paramount, and that technologies for the latter were sophisticated, ranging from spears, traps, nets, poisons, and hook and line,


**Figure 3 Shell artifacts from the Grand Bay site on Carriacou (photos by Quetta Kaye).**

though fishhooks and other tackle are rarely found. Much of the assumed technologies are inferred from the composition of zooarchaeological assemblages (Keegan 1986; Newsom and Wing 2004).

Through the Early Ceramic Age, there is abundant evidence for population expansion and increased sociopolitical complexity across the region, but with exchange systems constantly in flux. New islands appear to have been settled for the first time during the terminal Saladoid period (ca. 2000–1500 cal yr BP), including much of the southern Lesser Antilles. St. Lucia, St. Vincent, the Grenadines, and Grenada were all settled around or slightly after 2000 cal yr BP, centuries after islands in the north. The reasons for this phenomenon are still unclear. However, a technological innovation seen only on islands in the south (observed archaeologically on Barbados, Carriacou, Mustique, and St. Vincent) known as "pot stacks" — in which holes were dug deep into the ground and lined with ceramic vessels to create stable wells for tapping the Ghyben-Herzberg (freshwater) lens — may have allowed people to live year-round at sites or on islands that lacked ready or consistent access to freshwater (see Drewett 2000, 2007, 49–65; Schultz 1995). These pot-lined wells were made by firing large ceramic pots, carefully chipping away the bottoms, and then stacking them in holes supported by rocks and wooden wedges. Wells lined only with wooden planks were also observed at the Heywoods site in Barbados dating between ca. 1200 and 1000 cal yr BP (Drewett 2000, 49–50).

Also occurring during this interval of time is an observed decline in microlapidary trade networks in the northern (Leeward) islands. The first appearance of spiritually charged objects known as *zemis/cemis* occurs around 1700 cal yr BP, and these were initially classified by Fewkes (2009, originally published in 1907). These were made into a variety of forms from both perishable (e.g., cotton and wood) and non-perishable materials, but archaeologically they are most often recovered as "three-pointers," constructed from a variety of durable materials, including shell, limestone, and calcirudite (e.g., see Hofman et al. 2007, 253), and are thought to represent the physical manifestations of Amerindian spirituality (Figure 4). Scholars have argued that their triangular shape is reminiscent of the mountainous formations so often seen in the geologically youthful volcanic islands of the Lesser Antilles. These portable religious artifacts eventually take on more elaborate forms and style, particularly in the northern Caribbean (e.g., see McGinnis 1997; Oliver 2009), and their embellishment accompanies the rise of complex Taíno chiefdoms during the Late Ceramic Age who begin to yield greater influence in the southern islands in the centuries before European contact.


**Figure 4** ***Zemis*** **from the Lesser and the Greater Antilles. (A–F) All from Carriacou (A and E as well as B and F are different views of the same figures (photos by Quetta Kaye); (G–H) two views of an artifact from Puerto Rico in the W. Geigel collection; (I and J) University of Puerto Rico collections (all courtesy of José Oliver).**

## 5. Late Ceramic Age (ca. 1500–500 cal yr BP)

The latter stages of the Ceramic Age in the Caribbean are marked by a number of important changes culturally, sociopolitically, economically, and demographically (Hofman et al. 2007, 2008a, 2008b) that are evident from a variety of different lines of evidence. Across the Antilles, the number of sites on each island steadily increases, reflecting greater population growth, territoriality, and regionalization. Of significance is the first archaeological evidence for the colonization of the Bahamian archipelago and Jamaica ca. 1600/1500 cal yr BP (Berman and Gnivecki 1995) by Ostionoid groups who moved westward into Hispaniola and Cuba after a 1000-year "long pause" by Saladoid peoples in Puerto Rico. The reasons for this temporal gap are still unclear, though it may be related to the presence of well-established Archaic populations who had already colonized much of the Greater Antilles thousands of years before (Keegan 2000, 147–151). Strangely, the Cayman Islands seemed to have remained undiscovered until the arrival of Europeans (Scudder and Quitmyer 1998), and there is no hard evidence for contact with North America either that seems unusual given its closeness, though many scholars have alluded to such based on geographical proximity, similarities observed in language, burial customs, agricultural practices, pottery designs, and stone artifacts, for example (Helms 1988; Marquardt 1990; Rouse 1986). Florida lies just 85 km from the Bahamas and 150 km from Cuba, though the strong currents that move through the Florida Straits and eventually form the powerful Gulf Stream — in conjunction with relatively basic seafaring technologies found in the region (i.e., dugout canoes without more advanced watercraft configurations such as the sail and outrigger, that are found in other parts of the

world) (Fitzpatrick 2013a) and the limited detectability from sea presented by the low-lying topography of Florida and the Bahamas — may have played a role in hindering contact, as would have the presence of Calusa groups in South Florida (Widmer 1988).

In the northern Caribbean, the rapid movement of Ostionoid peoples west and north is largely evident through the presence of a thin, mostly undecorated redware pottery that probably evolved from earlier Saladoid traditions. Named after the Punta Ostiones site in Puerto Rico, Ostionoid develops into a number of different local styles, the first of which is Ostionan and found on Puerto Rico. This Ostionan Ostionoid pottery is "characterized by straight-sided open bowls and boat-shaped vessels with loop handles on either end that rise above the rim […] [which] replaced the bell-shaped bowls and D handles of the Saladoid" (Keegan 2000, 148; see also Rouse 1992). At around the same time, between ca. 1400 and 1100 cal yr BP, there is evidence of numerous subseries of Ostionoid pottery in use, ranging from the expansive Ostionan in western Puerto Rico, Cuba, Jamaica, Haiti, and Grand Turk, to Elenan in eastern Puerto Rico, Chican in southeastern Dominican Republic, Meillacan west from Haiti into Cuba and Jamaica, and Palmettan in the Bahamas. The persistence of Cedrosan Saladoid on several islands such as Culebra, St. Eustatius, and Saba (Keegan 2000, 148), and a convergence of styles in Archaic contexts (e.g., see Hung and Rojas 2013), are indicative of culture contact, diffusion, and integration. Despite the variety of styles and subseries evident in the northern Caribbean post-1400 cal yr BP, the pottery generally becomes coarser, thicker, and plainer through time, a phenomenon that also occurs in the southern Lesser Antilles, but with different ceramic traditions. The decline of ceramic decorative elements and craftsmanship, however, should not overshadow the rich artisanry found in Amerindian material culture at the time of Columbus' arrival. This is particularly true in the Greater Antilles where a number of different media were used to create intricately designed and beautifully made objects from wood such as *duhos* (ceremonial seats), zoomorphic benches, canopied stands to hold *cohoba* powder used during ritual events, ceremonial staffs or batons; shell modified into beads, pendants, figurines, and *guaizas* (carved shell masks) (see Mol 2007); stone used to produce three-pointers and other *zemí* types, ovate shaped collars, and pillar stones like those seen at ceremonial plazas often called *bateys* that were the focus of ceremonial events and/or playing a soccer-like ball game with the same name (excellent examples can be seen at the Tibes and Caguana sites in Puerto Rico (Figure 5) (Torres et al. 2014), as well as many other locations around the northern Caribbean (Alegría 1983)); and bone for making vomit spatulas, spoons, and many other objects that are too numerous to describe here (Figure 6). Many of these objects rival those found in many other parts of the Americas in their artistry and workmanship (e.g., see Bercht et al. 1997; Conrad et al. 2001; Fewkes 2009; Loven 2010; Oliver 2009; Ostapkowicz et al. 2011, 2012, 2013) and were integral parts of Taíno culture that had

**Figure 5 The Caguana site in northwest Puerto Rico, which has some of the Caribbean's best examples of plazas thought to be used for ceremonial events and/or to play a soccer-like game known as *batey*. Top: smaller plaza at Caguana with upright stone arrangements lining opposite sides; middle: larger plaza showing stone pavements lining the edge; bottom: examples of intricate petroglyphs found on many of the upright stones that line the plaza (all photos by Scott M. Fitzpatrick).**

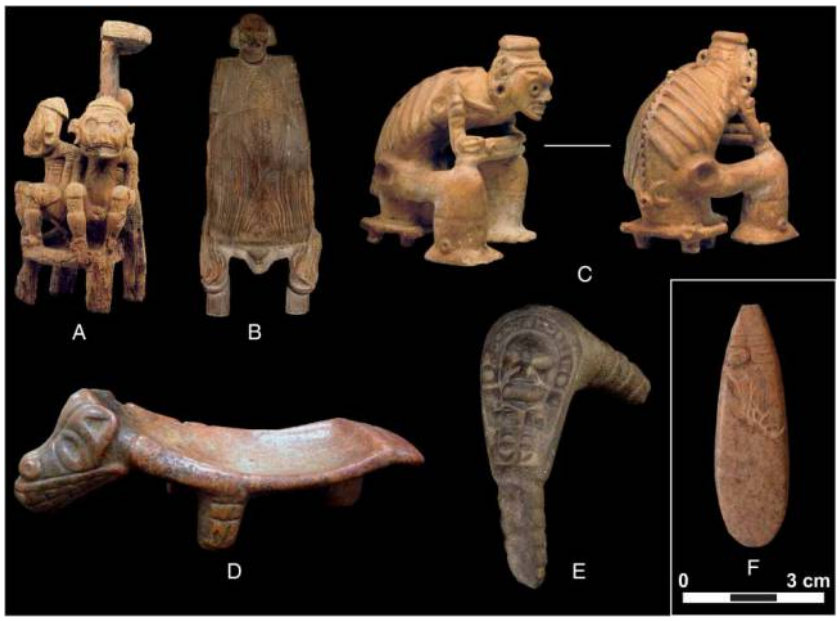


**Figure 6 Examples of Taíno or Taíno influenced ritual artifacts. (A) *Cohoba* plate showing twins from the Museo del Hombre Dominicano; (B) *duho* from the Kew Gardens collection; (C) ceramic figure jar from the Museo del Hombre Dominicano; (D) *duho* from the Oliver Arecibo, Puerto Rico collection; (E) elbow stone from the Museo de America (all courtesy of José Oliver); (F) incised turtle bone vomit spatula fragment from Grand Bay, Carriacou (photo by Quetta Kaye).**

become more socially complex over time, with an emerging class of elites who controlled symbolic and ritual aspects of life (Curet 1996; Oliver 2009).

In the Lesser Antilles there is a cultural divergence in pottery, which Rouse (1992) termed Troumassoid after the type site of Troumasee on St. Lucia (Figure 7). While it was once thought that Troumassoid began ca. 1500/1400 cal yr BP and was later replaced around 1000 cal yr BP by an infiltration of new migrants from South America known as Suazoid (named after the Savannah Suazey site in Grenada) based largely on differences in pottery


**Figure 7 A selection of ceramic types from the southern Caribbean during the Late Ceramic Age found at the Grand Bay site on Carriacou. (A) Bowl from Grand Bay (2007), illustrated by John Swogger; (B) exterior incised; (C) lugs and models; (D) ceramic pestle (peccary?) perforated for suspension; (E–G) finger-impressed rims (photos by Quetta Kaye).**

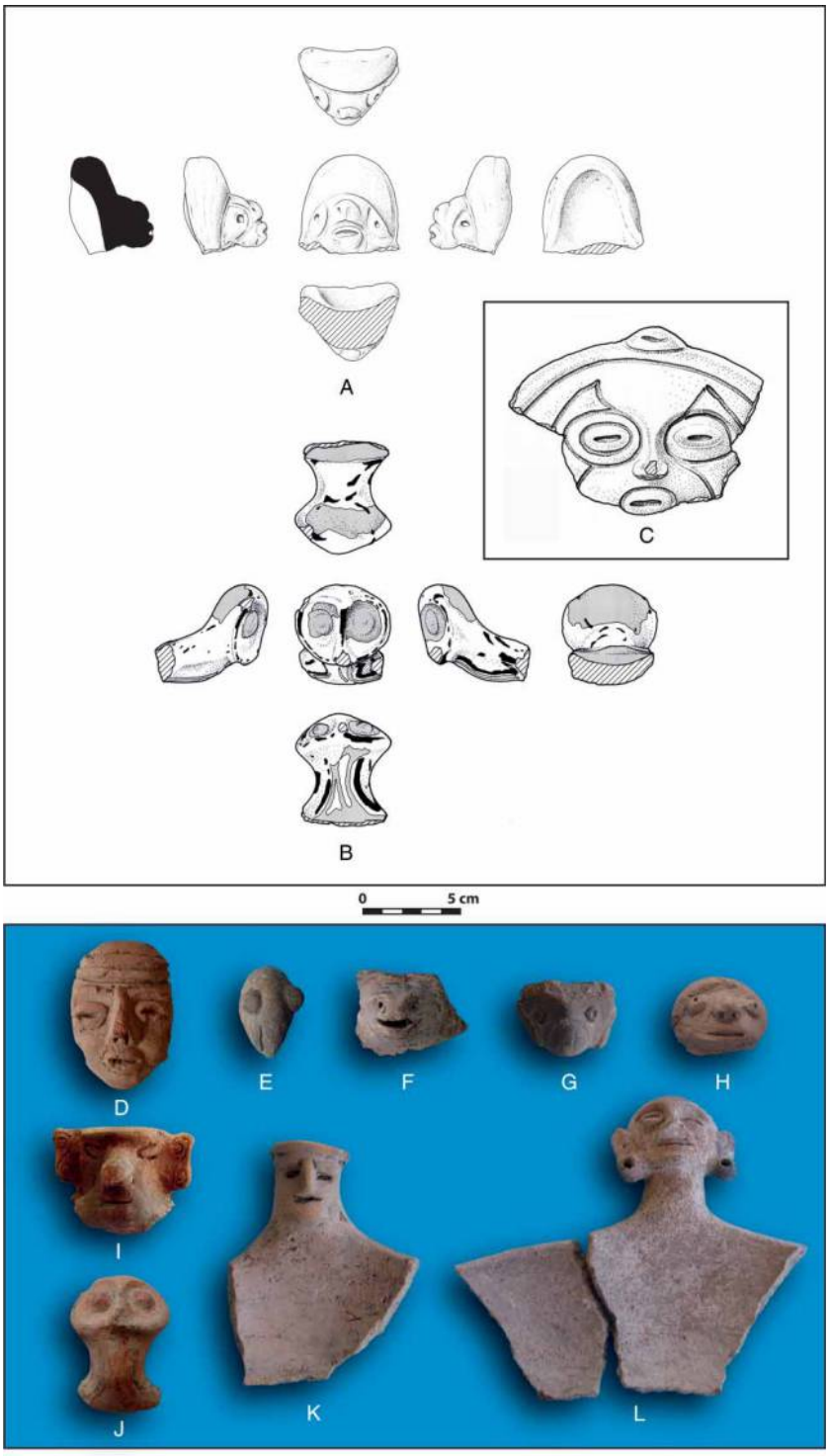


**Figure 8 Adornos recovered from the Grand Bay site on Carriacou (A–D, F–H) and Coconut Walk on Nevis (E). Note the "coffee bean" eyes on (C) and (D) and bird forms on (E) (parrot) and (J) (owl) (A–C illustrated by John Swogger; D–H photographed by Quetta Kaye).**

manufacture, it is now recognized that these were internal developments, hence the more accepted usage now of Troumassan Troumassoid to describe the earliest stages of the Late Ceramic Age in this part of the Caribbean and Suazan Troumassoid for the general end point (see Petersen et al. 2004). Troumassan ceramics, which also have regional variations that include what Rouse (1992) referred to as the Mamoran Troumassoid (for the Mamora Bay site on Antigua) and Elenan/Chican Ostionoid in the islands north of Guadeloupe and east of Puerto Rico, still incorporate some of the same decorative elements as their Saladoid predecessors, with black, red, and white slips and rectilinear and curvilinear incisions. Adornos are still in use, with many exhibiting animals such as birds, frogs, and bats as well as humans (Figure 8), as are ceramic stamps that were used to decorate the body with different colored


**Figure 9 Ceramic body stamps found throughout the Antilles were one of the most common less-permanent ways to decorate the body. Many have the characteristic triangular, curvilineal, and chevron designs seen in other works of art and petroglyphs (photos taken by Quetta Kaye). Some such as B were cylindrical and could be rolled to repeat the pattern.**

minerals or paints (Figures 9 and 10). Unfortunately, there has been a paucity of mineralogical and compositional analyses of pottery in the Caribbean to determine the provenance of paste, temper, and decorative elements used that would help identify manufacturing techniques, modes of exchange, and a host of other questions. A notable exception is a number of papers published in a special issue of the *Journal of Caribbean Archaeology* (see Descantes et al. 2008) that highlights the use of neutron activation analysis to examine these questions. Petrographic analysis of thin-sections, common in many other parts of the world to identify temper constituents and provenance of ceramics, is also sorely underused in the Caribbean. Pavia et al.'s (2013) detailed petrographic study of sherds from Carriacou, one of the first of its kind for Pre-Columbian pottery in the Caribbean, demonstrated that there was a variety of temper types and that most pottery during this time was likely imported. Other studies demonstrate the use of volcanic sands in pottery found on limestone islands, suggesting either the importation of pottery or igneous-derived materials for producing vessels (see Donahue et al. 1990; Watters 1997, 93).

Like the Ostionoid tradition, Troumassoid ceramics become plainer and cruder through time. This is particularly evident in the Suazan series where there is a reduction in the use of colored slips and decoration largely consists of finger- or finger-nail impressions along the rims of vessels, scratched surfaces, and human-faced adornos with flaring ear spools (Petersen et al. 2004), a practice commonly seen with peoples in the Amazonian region of South America. It should be noted that while "Suazoid" is no longer

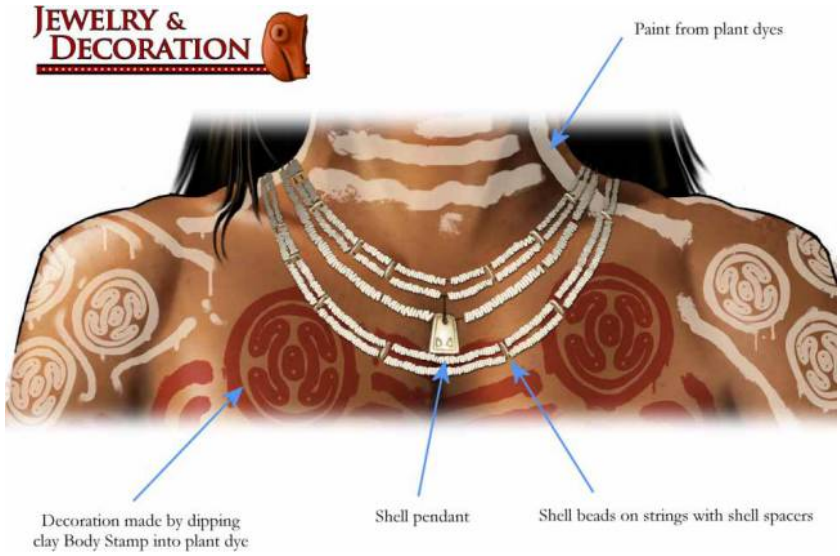


**Figure 10 Amerindians used a variety of different paints made from plants or minerals to decorate the body using ceramic stamps, in addition to adorning the body with pendants and jewelry (illustrated by John Swogger).**

considered to be an invasive Island Carib group who originated from the South American mainland and displaced inhabitants of the southern Lesser Antilles, there does appear to be an increasing coalescence of groups in this part of the Caribbean who established and maintained ties with islanders in the north and mainlanders to the south. Cayoid series pottery, named after the Cayo complex seen on St. Vincent and known from other islands such as Dominica, Grenada, Guadeloupe, Martinique, Saint Lucia, Saint Vincent, and Trinidad, has pottery similar in style to Koriabo from the Guianas (Boomert 1986; Hofman 2013, 212) and seems to suggest increased interaction with this part of the South American mainland later in time. When coupled with Taíno related objects such as *zemis* and vomit spatulas, the evidence suggests a local hybridization of numerous cultural modes of behavior just prior to and after European contact in Trinidad, Tobago, and the southern Lesser Antilles.

There is still much fluidity in terms of the movement and exchange of objects, ideas, and people, with boundaries between "style zones" of various artifact types (ceramic and stone in particular) waxing and waning through the islands over the course of the last millennium preceding European contact (Hofman et al. 2007). The continued use of *zemis* is notable and reflects growing influence from the Taíno chiefdoms in the Greater Antilles. An excellent example is the recent discovery in 2014 on Carriacou of one of the largest three-pointers found in the Windward Islands, measuring 46 cm long and weighing more than 5 kg. A human face on one end bears the characteristic wide eyes, gaping mouth, and segmented ears with pierced lobes often associated with Taíno groups in the Greater Antilles (Fitzpatrick et al. in press). Figure 4 shows the similarities between those found in Puerto Rico, for example, and that of the Carriacou specimen. *Zemis*, however, are but one of many aspects of material culture and broader spiritual and political influence that the Taíno began wielding during the Late Ceramic Age. While it is not possible to discuss in detail here the rich mythology, symbology, spirituality, and social structure of these groups that was recorded after European contact and later expounded on by Caribbean scholars, readers are referred to Oliver (1997, 2000, 2009), Stevens-Arroyo (1988), and Curet (2014) who provide excellent summaries of these topics.

Though microlapidary items decrease in frequency over time, many different types of stone continue to be used, particularly serpentinite and jadeite/jadeitite for producing pendants and celts/axes. The presence of greenstone in particular has perplexed archaeologists for many years given their commonality in archaeological sites dating to the Ceramic Age as no native sources of jadeitite were known in the Caribbean. A study of jadeitite celts from Antigua by Harlow et al. (2006) suggested that they most likely came from the Motagua source in Guatemala, though other undiscovered indigenous sources could not be ruled out. In the last few years, however, new jadeitite sources in the Dominican Republic (Schertl et al. 2012) and Cuba (Cárdenas-Párraga et al. 2012) have been described and added to the list of possible source locations for the Caribbean artifacts. While these still do not appear to have been used for producing the Antiguan tools or artifacts more recently analyzed from St. Eustatius (see Garcia-Casco et al. 2013) — with the Motagua source still seemingly the most likely provenance — it should be noted that the sample sizes in both the Harlow et al. (2006) and Garcia-Casco et al. (2013) studies were quite small, and further analysis of additional artifacts and more detailed geological survey in the Greater Antilles may alter this view.

In addition to the movement of artifacts, mammals (and/or objects made from their remains) were also transported, a phenomenon that occurs largely post-1500 cal yr BP. These include the guinea pig (*Cavia porcellus*) (LeFebvre and deFrance 2014), agouti (*Dasyprocta* sp.; e.g., *Dasyprocta leporina*), opossum (*Didelphis* sp.; e.g., *Didelphis marsupialis*), armadillo (*Dasypus* sp.; e.g., *Dasypus novemcinctus*), peccary (*Tayassu*/*Pecari* sp.) (see Giovas et al. 2012 for a recent review of these five animal distributions), and dog (*Canis familiaris*) (Laffoon et al. 2015). Added to this are newly discovered paca (*Cuniculus* sp.) (C. Giovas, personal communication 2014) and two ungulates: white-tailed deer (*Odocoileus virginianus*) and brocket deer (*Mazama* sp., possibly red brocket based on size) that were already known from Aruba, Curaçao, Islas Los Roques, Trinidad, and Tobago, but seen for the first time in the Antilles on Carriacou and Grenada (Figure 11). These new specimens include scored and broken distal metapodials along with an incised and drilled mandible from the Sabazan site on Carriacou. Animal teeth used as pendants from jaguar (*Panthera onca*), tapir (*Tapirus terrestris*), and peccary have also periodically been found — mostly in Puerto Rico, parts of the northern Lesser Antilles, and the southernmost islands of Carriacou and Grenada — but were probably brought in as raw materials or already modified objects from South America or Central America based on strontium and oxygen isotope analyses (Laffoon et al. 2014). The Puerto Rican hutia (*Isolobodon potoricenscis*), a rodent native to Hispaniola, was also transported by humans to Puerto Rico and the Virgin Islands prehistorically (Newsom and Wing 2004). Overall, most translocated animals do not appear in any great numbers, with


**Figure 11 Animals known to have been translocated into the Caribbean islands prehistorically (A–F). (A) Agouti (*Dasyprocta leporine*); (B) opossum (*Didelphis marsupialis*); (C) guinea pig (*Cavia porcellus*); (D) armadillo (*Dasypus* sp.); (E) paca (*Cuniculus* sp.); (F) peccary (*Tayassu*/*Pecari* sp.); (G) artifacts and processed bones made from deer, including brocket deer (*Mazama* sp.), which have also been found on select islands; (H) hutia (*Isolobodon* sp.), native to the Greater Antilles but moved between islands prehistorically. All photos from Wikimedia except for (B) (taken by Christina M. Giovas).**

agouti and opossum by far the most common (Giovas et al. 2012). It has often been argued that most of these Neotropical mammals were introduced for use as prestige foods or in ritual events, though this is largely based on their low abundance compared to other fauna recovered in zooarchaeological assemblages. LeFebvre and deFrance (2014) argue against this for guinea pig, noting that their paucity in archaeological sites could be the result of various taphonomic or cultural processes.

Apart from these mammal translocations, Amerindians continued to exploit a number of other terrestrial animals, including lizards, snakes, amphibians, birds, land crabs (Gecarcinidae), and rice rat. On islands where there were perennial streams, rivers, and lakes (primarily the Greater Antilles and larger volcanic islands in the Lesser Antilles), freshwater resources such as fish were also harvested as demonstrated from sites on Puerto Rico, for example (Carlson and Steadman 2009; Curet et al. 2006). There was a continued focus on marine foods through the end of the Late Ceramic Age. Like the Early Ceramic Age, larger animals such as the Caribbean monk seal, cetaceans, manatees, and even turtles do not appear widely in archaeological assemblages. While there is no artifactual evidence

(e.g., harpoons) to suggest a tradition of whaling, there are sites such as CE-34 in eastern Puerto Rico dating to the early Ostionoid period that shows the butchering of manatees (Carlson et al. 2015). The general dearth of manatee and turtle remains in many Caribbean archaeological sites may simply be the result of butchering techniques whereby the meat was harvested on the beach and the skeletal elements left to scavengers and the sea to take away.

Mollusks were heavily exploited and dominated in many assemblages by gastropods, such as the queen conch, West Indian top snail (*Cittarium pica*), and *Nerita* spp. (Newsom and Wing 2004; also Keegan et al. 2008). Queen conch was still important not only for food, but for its shell that continued to be used for producing adzes, pendants, figurines, and many other objects. Finfish such as parrotfish (Scaridae), wrasses (Labridae), jack fishes (Carangidae), tunas and mackerels (Scombridae), snappers (Lutjanidae), flying fish (Exocoetidae), groupers and seabasses (Serranidae), jacks, mackerels, scads (Carangidae), grunts (Haemulidae), surgeon fishes (Acanthuridae), triggerfishes (Balistidae), and many others were also captured in great numbers (Carder et al. 2007; Grouard 2010; LeFebvre 2007; Newsom and Wing 2004; Wing and Wing 2001). Given the intensity of marine resource exploitation as populations grew and territories expanded in the Late Ceramic Age, it might be expected that terrestrial and marine environments were being impacted, and in some cases it appears that they were (Fitzpatrick and Keegan 2007; Keegan et al. 2003; Pestle 2013; Wing 2001). However, there are also instances where intensive harvesting of marine foods appeared sustainable for centuries, as research on fishing in Anguilla (Carder et al. 2007) and mollusks found at the Coconut Walk on Nevis (Giovas et al. 2013; Poteate et al. 2015) clearly demonstrate.

The skeletal record for Ceramic Age sites is quite extensive, with a number of cemeteries and other burial sites such as Maisabel, Monserrate, Punta Candelero, and Tibes on Puerto Rico (Curet and Oliver 1998; Rodríguez 1997; Siegel 1996), Lavoutte on St. Lucia (Hofman et al. 2012), Grand Bay on Carriacou (Fitzpatrick et al. 2009), Anse a la Gourde on Guadaloupe, and Canímar Abajo on Cuba (containing both Archaic Age and later interments; see Roksandic et al. 2015). Many of these sites contain dozens of burials, with some having more than 100 (Anse a la Gourde) or 200 (Canímar Abajo) individuals. In general, individuals buried during the Ceramic Age were interred in a flexed position, perhaps as a result of being wrapped in a bundle or hammock. Both primary and secondary burials are known, as are cases of cremation and retention of skulls and long bones (sometimes added to other graves) (Crespo-Torres et al. 2013; Hoogland and Hofman 2013). The inclusion of grave goods, including beads, amulets, and ceramic vessels are more common during the Early Ceramic Age and rarely found later in time. Some typical and unusual variations are found throughout the Caribbean, including both loose and tight flexing, multiple burials, inclusions of crania or other elements from different individuals, placement of bodies with animal remains such as turtle, interments in complete bowls as seen at the Tutu site in the Virgin Islands (Righter 1997, 78–79), the placement of complete ceramic vessels near or around the body, and somewhat uniquely, a female in her early 20s at the Point Bay site on Carriacou who was found partially surrounded by stones, but also clutching a large stone with another in her lap (e.g., see Figure 12). In general, most human burials found in the Caribbean are of adults, with infants and juveniles underrepresented, perhaps due to different mortuary behaviors and/or preservation issues. In rare cases, infants have been found accompanied by grave goods though, including ceramic vessels at the Golden Rock site on St. Eustatius (Righter 1997, 78–79), another from St. Croix that was found inside a beautifully designed bowl with shells by Gudmund Hatt in the early 1920s (Gillott 2009), and a number of others from parts of Puerto Rico and the Virgin Islands who were intentionally placed inside bowls (Rainey 1940, 190–197).

Genetic evidence from Saladoid-era samples dating between ca. 2500 and 1500 cal yr BP still remains elusive. Mendisco et al. (2015) attempted to extract aDNA from 38 individuals from 11 different sites on Guadeloupe and the adjacent smaller islands of La Désirade and Marie-Galante that spanned the Ceramic Age. While the sample included Saladoid samples, the only successful extractions were from samples ($n = 13$) that dated to the Late Ceramic Age between ca. 800 and 500 cal yr BP. These are the first for the Lesser Antilles and demonstrate the presence of three mitochondrial lineages (A2, C1, D1) and the Ht-05 and Ht-09 mtDNA-haplotypes, similar to what was found in the Ciboney samples from Cuba (Lalueza-Fox et al. 2003). The authors note that their analysis "showed the strongest genetic affinities with groups from northern South America […] [and] could not be significantly differentiated from extant groups in Venezuela (Wayuu, Guahibo), Colombia, Guiana (Apalai, Waunana) or Amazonia" (Mendisco et al. 2015, 6). Interestingly, the Guadeloupe samples showed a closer genetic affinity with inland populations versus those inhabiting the coast, suggesting that population dispersals involved extensive use of riverine systems.

In another study, Lalueza-Fox et al. (2001) analyzed 27 Pre-Columbian Taíno samples from the La Caleta


**Figure 12 Human burials found at the Grand Bay and Point Bay sites on Carriacou. (A) Burial F0164 in a flexed position, which was found with a complete cranial vault placed intentionally above it (680–560 cal yr BP); (B) female found at the Point Bay site who was in her early 20s almost completely surrounded by stones, and another large stone was placed in her lap with a second clutched in her arms (670–560 cal yr BP); (C) Burial F0180, an individual placed in a flexed position on left side surrounded by four complete bowls and plates, three of which were reconstructed (D and G are opposite sides of same vessel) (1330–1270 cal yr BP). All radiocarbon dates from human bone calibrated using CALIB 7.1 at 2$\sigma$ with 50 per cent marine to reflect a mixed diet. Photos (A–C) taken by Scott M. Fitzpatrick; photos (D–G) taken by Quetta Kaye.**

site in Hispaniola and found only the C and D mtDNA lineages, with the majority (75 per cent) belonging to the former. This again suggests strong phylogenetic connections to South America prehistorically, with the sequencing and haplogroup data from La Caleta showing "a substantially reduced mtDNA diversity, which is indicative of an important founder effect during the colonization of the Caribbean Islands" (Lalueza-Fox et al. 2001, 137). Preliminary findings by Schroeder (2015) of a Taíno sample from a cave in the Bahamas dating to around 1000–1100 cal yr BP also shows affinity to northern South America. Research by Toro-Labrador et al. (2003) on 13 modern individuals from Aruba, not surprising perhaps given its proximity, showed a high frequency of haplogroup D mtDNA, while a more recent study of 326 modern inhabitants from Puerto Rico demonstrated that around 60 per cent had indigenous mtDNA haplotypes, primarily from the A2 and C1 haplogroups. Both of these latter two studies, similar to what was found in the archaeological specimens, support a strong South American influence in the Caribbean, whereas they lack solid genetic connections to Mesoamerica, though this could change with future research. Vilar et al. (2014) did note that the A2 haplotype is quite common in Mexico (also see Schurr 2010) and

> would seem to be the likeliest source of A2 haplotypes for the Greater Antilles. However, despite the fact that indigenous Mesoamerican groups exhibit well over a hundred distinct A2 HVS1 haplotypes, only one of these […] appears in [the] Puerto Rican data set. In addition, the Puerto Rican A2z and A2* haplotypes are missing the C64T mutation in HVS2, which is present in the vast majority of A2 types in Mesoamerica. (Vilar et al. 2014, 362)

In a related study, Melton et al. (2007) attempted to determine the biological relationships between

Chibchan speakers who resided in lower Central America and northern South America by examining the diversity of mtDNA haplogroups and haplotypes from 188 individuals affiliated with four different groups from northeast Colombia: three Chibchan (Kogi, Arsario, and Ijka) and one Arawak (Wayuú). Their results demonstrated the "existence of a shared maternal genetic structure between Central American Chibchan, Mayan populations and northern South American Chibchan-speakers […] [and suggested] an expansion of Chibchan-speakers into South America associated with a shift in subsistence strategies because of changing ecological conditions that occurred in the region between 10,000–14,000 years before present" (Melton et al. 2007, 753). This suggests that not only was there a deep antiquity to native populations in Colombia that derive from Mesoamerica, but that population movements continued later in time, probably related to the widespread movement of exchange items, cultigens such as sweet potato and maize (which as noted previously have a much greater antiquity in northern South America than once thought [Pagán-Jiménez et al. 2015]), along with many other aspects of cultural behavior.

## 6. Discussion and conclusions: population origins, dispersals, and interactions

As research thus far demonstrates, Caribbean prehistory was dynamic and fluid. The Taíno groups in Cuba, Hispaniola, and the Bahamas who were the first to "greet" Columbus (sensu Rouse 1992) in AD 1492 represented an endpoint of millennia of population movements, interaction, and cultural (ex)change that occurred across the region (Keegan 1994, 1995, 2000). In this review, I have tried to highlight some of the major colonization events as observed through current archaeological data and how these and other sources of information (e.g., genetics) are providing new insight into what transpired after populations dispersed into these islands at varying points in time.

Continued research on the origins and movement of populations in the Pre-Columbian Caribbean is shedding new light on how these movements were structured, their trajectories, and the connections they had with islands and mainland areas. Evidence suggests that Cuba and Hispaniola were the first islands in the Antilles to be settled around ca. 7000 cal yr BP, with a slightly earlier colonization of Trinidad when sea levels were lower and connected it to the South American mainland. The exact origin of the first colonizers is still unknown, with some archaeological and genetic evidence pointing to Mesoamerica, but with South America not being ruled out, particularly given the very ephemeral nature of the data and genetic evidence from primarily (or exclusively) Late Ceramic Age individuals and modern populations showing a strong connection to the latter. By 5500–3500 cal yr BP, Puerto Rico and many islands in the northern Lesser Antilles were also settled, as was Barbados in the south, but the reasons behind the patchiness of this pattern is still unclear. These Archaic groups, which were once thought to be nomadic foragers, are now recognized for having a much more diversified subsistence than once thought that included cultivating plants and exchanging lithic materials, especially cherts from Antigua (Davis 2000).

Beginning around 2500 cal yr BP, Saladoid groups first appeared in Puerto Rico and the northern Lesser Antilles, and by 2000 cal yr BP, they occupied nearly all of the islands of the Lesser Antilles with the exception of some of the smaller islands in the Grenadines until ca. 1700 cal yr BP. Saladoid groups brought with them new subsistence crops and a strong pottery making tradition that clearly links these peoples to South America. This is confirmed by DNA (ancient and mitochondrial) extraction and sequencing that also supports a solid South American connection for these and possibly earlier Archaic groups. This early phase of the Ceramic Age represents the most widespread and intensive movement of populations seen in the Pre-Columbian Caribbean, though interestingly they appear to have stopped east of Hispaniola and south of the Bahamian archipelago, with Jamaica also apparently remaining uncolonized. Why this pattern of settlement has emerged is unclear, though Giovas and Fitzpatrick (2014, 15) suggest that the data support what might be predicted in a behavioral ecology framework, whereby Caribbean colonization was structured by a combination of habitat suitability (captured by predictions grounded in ideal free distribution modeling), territorial behavior (as observed through the ideal despotic distribution [e.g., the Saladoid "long pause"]), and variables that were historically particular (e.g., oceanographic conditions, seafaring capabilities, and technology). Additional data and theoretically informed approaches should help to refine and expand these notions.

Around a thousand years later, ca. 1500 cal yr BP, there was a diffusion of peoples (Ostionoid) as they dispersed across the Greater Antilles and into the Bahamas and Jamaica for the first time, but do not appear to have colonized the Caymans or make contact with North America. That populations were growing rapidly is evidenced by a dramatic increase in the number of sites found on all of the islands. Through time, these groups become intricately connected through exchange systems in which a host of materials, goods, ideas, animals, and people moved in fluctuating patterns dependent on social group dynamics, development of more complex economic

and political regimes, and shifting territorial bases (Hofman et al. 2007). By the time of European arrival, Taíno groups in the Greater Antilles and parts of the northern Lesser Antilles were wielding greater influence across the Caribbean, exemplified by ritualistic belief systems involving the ingestion of the powerful hallucinogen *cohoba*, deference to numerous deities, production of *zemís*, stonework architecture (e.g., *bateys*), and a rich artisanal tradition (Oliver 1997, 2009). As Curet (2014) aptly notes, however, despite many similarities, the Taíno were not a homogenous group, with archaeological evidence showing many quantitative and qualitative differences in material culture and other modes of cultural behavior between the islands during this time.

## 7. Future directions

The Caribbean once sat on the periphery of New World prehistory, marginalized as an afterthought in textbooks, and characterized more for its historical connections to Columbus and subsequent European colonizers than its Amerindian heritage. This has now dramatically changed, with increased attention by scholars to investigate in more detail the myriad complexities observed in the linguistic, genetic, and archaeological records and amplified by new discoveries on many different islands. Where do we go from here?

A number of new and sophisticated analytical techniques are helping researchers move forward (Hofman et al., 2008b). Though still in its infancy, continued attempts to extract aDNA from Pre-Columbian human remains as well as from modern populations will surely pay large dividends in resolving where Amerindian groups originated from and how they dispersed and interacted across the Caribbean (Lalueza-Fox 2001, 2003; Mendisco et al. 2015). Both light (O, C, N) and heavy (Sr, Pb) isotopic analyses on human, animal, and plant remains is already providing extraordinary results on the movements of people and artifacts (e.g., Laffoon et al. 2014, 2015), but in many ways these are still underused by many researchers. And while the number of provenance studies of artifacts has steadily improved (e.g., Garcia-Casco et al. 2013; Pavia et al. 2013), the dearth of non-typological research on ceramics, which are by far the most ubiquitous artifact type found prehistorically in the Caribbean, is troubling and sorely lags behind many other island regions of the world such as the Pacific where it is quite common and helped tremendously in understanding manufacturing techniques and reconstructing interaction and exchange systems (e.g., Dickinson 2006).

I have argued in the past for expanded use of radiocarbon dating in the region and continued scrutiny of chronologies using a chronometric hygiene approach (Fitzpatrick 2006). This is also slowly improving, though it is still concerning that greater steps are not taken to ensure that samples are suitable for submission. This would include identifying the taxon of charcoal to reduce the chances of dating non-local species that may have drifted to the region (i.e., the "old wood" problem), selecting twigs or juvenile species of animals to remove inbuilt-age, and dating multiple samples within the same stratigraphic contexts to ensure chronological integrity of the cultural deposit. In addition, like many other island and coastal regions around the world, marine shell is often used as a sample type for radiocarbon dating, but the Caribbean lacks local reservoir corrections ($\Delta R$) for nearly all of the islands, including the whole of the Lesser Antilles. Preliminary research suggests that these corrections may greatly influence existing chronologies on some islands (Fitzpatrick and Rick 2015) and have the potential to address some of the confusion and apparent anomalies observed in various assemblages.

Another important but understudied realm of inquiry that would have tremendous benefit to understanding the nuances of Caribbean societal changes prehistorically is how climate may have affected human populations (Cooper and Peros 2010). Though there have been a number of studies in the Greater Antilles and along the circum-Caribbean (e.g., see Burney and Burney 1994; Higuera-Gundy et al. 1999; Velez et al. 2014), with several research projects in the region now focused on recovering paleoecological data in a variety of forms (e.g., Rivera-Collazo et al. 2015), much of it is still in its infancy or remains unpublished. The current coarseness of these data will continue to limit how we conceptualize human–environmental relationships and should become a major priority in the future.

Lastly, Keegan and Rodríguez Ramos (2004) noted that a decade ago the Caribbean was essentially in a theoretical crisis. What the Caribbean requires is for scholars to move beyond largely interpretive frameworks that rely on historical narratives, to ones informed by theoretical modeling such as island biogeography (Keegan and Diamond 1987), behavioral ecology (e.g., Giovas and Fitzpatrick 2014), graph theory embedded within network analysis (e.g., Hofman et al. 2014; Mol et al. 2015), Darwinian evolutionary theory, or various theories applied to systems of exchange (Mol 2007), for example, that incorporate hard, quantifiable archaeological data into a coherent body of propositions that are used to predict phenomena. These and many other theoretical approaches should help move scholars away from qualitative assessments that currently dominate the literature and that are essentially a hangover from Rouse's (1992) culture-history systematic approach.[10] While

some Caribbeanists may claim to incorporate theory into their research, these are often simply epistemological approaches, not true theoretical frameworks for explanation and prediction. In essence, theory-driven research with testable hypotheses is lacking, but sorely needed to truly tease out the nuances of Amerindian lifeways, how they compare to other regions, and why these changed across space and time.

Despite these and other issues, the Caribbean is no longer the marginal nexus between two great continents. It is in fact a very dynamic region that is helping to answer many questions about New World population diversity in the ancient past, how peoples adapted to, lived in, and exploited island environments, and a host of many other important issues. For the Caribbean, the future is exceptionally bright.

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## Notes

1 In an earlier paper (Fitzpatrick 2004), I argued that archaeologists in the Caribbean were in many ways insular and too provincial, in part evidenced by the continued publication of research in conference proceedings published by the International Association for Caribbean Archaeology (IACA), which was not peer-reviewed and poorly or not accessible, and by the lack of publishing in more mainstream and high-impact journals. As Curet (2004, 187) also noted, "[…] the relative isolation of the Caribbean in mainstream trends of world archaeology […] has limited the potential of Caribbean archaeology to the discipline […] [so that] the Caribbean in many ways can still be considered one of the backwaters of modern archaeology." The fact that the Caribbean was rarely or never mentioned in standard introductory textbooks for archaeology and prehistory was also a testament to this problem, but this has slowly been remedied over the years.

2 The term "prehistoric" is firmly embedded in archaeology as a descriptor of time before the written record. This term has been rightly criticized for not always being entirely accurate given that "contact" with Europeans or other literate societies differed temporally and geographically, but also because it diminishes the importance of oral traditions in non-literate societies. In the Caribbean, the term prehistory is often replaced with one of several other terms, the most common of which has been "Pre-Columbian," or the time prior to the arrival of Columbus in AD 1492. Other terms include "Pre-Hispanic" (i.e., before the Spanish) and "Pre-Colonial" (i.e., before European colonists). In this paper, I use the term Pre-Columbian as this seems more clearly indicative of the very first encounter, broadly speaking, between Europeans and native Caribbean island Amerindians. This event, and the multiple contacts that took place during and after Columbus' first voyage, was pivotal in so many ways, setting the stage for what the historian Crosby (1972) famously called the "Columbian Exchange." These initial contacts between Amerindians and Columbus and his crews across a large swath of the northern Antilles — from the Bahamas to Puerto Rico, Hispaniola, and Cuba, and later to much of the Lesser Antilles, northern South America, and Central America between AD 1493 and 1503 — involved numerous social and biological transmissions. These included communicable diseases that quickly began to decimate native groups who had no natural immunity to smallpox, measles, and many other pathogens, along with the transfer of Old World plants and animals that began to quickly and dramatically alter New World environments. The term "Pre-Hispanic" is not entirely useful, for while much of Columbus' crew was Spanish, he himself was Genoese and subsequent voyages involved a host of different European nations that were continually engaged in commerce, conflict, and subjugation of native groups and Africans over a period of centuries. The term "Pre-Colonial" also infers the establishment of colonies, and while many Europeans did in fact establish outposts in the Caribbean and other parts of the New World beginning in the late 1400s, which later intensified in the 1500s and 1600s, not all contacts initially involved permanent settlement. In many cases, especially during the 16th century, islands were seen by explorers and occasionally visited to provision, trade, and interact with people, and/or drop off livestock to provide a source of food for later voyages. These contacts were not "colonial" at the outset, but did dramatically affect native Amerindian populations and fragile Caribbean island ecologies very quickly.

3 The Puerto Rico trench that extends between eastern Cuba and western Hispaniola is even deeper at around 8650 m (28,370 ft), though it is technically considered to be in the Atlantic Ocean.

4 For a list of the earliest acceptable radiocarbon dates for major islands in the Caribbean, see Giovas and Fitzpatrick (2014, 572–573).

5 Given a number of political and economic challenges in many places across the circum-Caribbean over the last 50 years, a large swath of the region remains understudied, particularly Cuba, Haiti, Venezuela, and Colombia. Recent events in Cuba, for example, are encouraging and should provide more opportunities for Cuban and outside scholars to collaborate and share resources. Several new research projects in these areas are hopeful enterprises that will add tremendously to what is known about population origins and dispersals into and between the Caribbean islands.

6 The Caribbean's oft-used cultural-historical framework was developed by Rouse (e.g., 1960, 1972, 1977, 1992) using a "modal" approach, a hybrid of the McKern Midwestern Taxonomic System and Linnaean classification for biological organisms. This was primarily an effort to categorize pottery, which had various stylistic and manufacturing attributes and that typically derived from contexts that lacked clear stratigraphy (or stratigraphic integrity), into a decipherable spatial and chronological framework. Essentially, Rouse was attempting to assign peoples or cultures to a particular set of "modes" found in pottery (see Keegan 2010, 141) in an effort to discern their origin and relationship to other archaeological cultures. These were categorized in a hierarchical system based on these modes (specific attributes), series (a group of people sharing a substantial number of modes), subseries, and styles (see Curet 2004). In the Caribbean, a series is assigned an "-oid" after the name of the type site where it was first identified. For example, "Saladoid" is the name given to the first group of peoples who settled the Antilles during the Ceramic Age beginning around ca. 2500 cal yr BP after the Saladero site in Venezuela. A subseries, or "smaller geographical, chronological, and cultural units, intermediary between series and styles" (Curet 2004, 193) is given the "an" suffix, so "Cedrosan Saladoid", named after the Cedros site on Trinidad, is a derivation of Saladoid culture. A style of Cedrosan Saladoid would represent "all of the pottery found within each people's spatial and temporal lines; in practice, styles represent both the ceramic assemblages and the people that created them" (Curet 2004, 193). While Rouse's classificatory-historical approach has been increasingly criticized for its underlying assumptions and convenient categories (e.g., Curet 2004; Keegan 2010; Rodríguez Ramos et al. 2010), the naming conventions continue to be widely used by scholars and are also referred to in this paper.

7 In recent years, it has become clear that the terms "Preceramic" or "Aceramic" are not sufficiently adequate to describe either the Lithic or Archaic age, given that: (1) these groups appear to have actually produced their own pottery (Keegan 2006; Rodríguez Ramos et al. 2008); and (2) in terms of Lithic groups, that they lacked ground stone technology, which is also disputed. Rodríguez Ramos et al. (2008) have suggested (at

least in terms of the ceramics found in the Antilles prior to Saladoid and Huecoid) that a more appropriate term for Lithic and/or Archaic groups in the Caribbean might be "Pre-Arawak," emphasizing the dynamic nature and technological sophistication of societies before the inception of the Ceramic Age ca. 2500 cal yr BP.

8 The terms "Ciboney" or "Guanahatebey" have often been used to describe peoples from western Cuba observed at European contact who apparently practiced a more primitive non-agricultural, nomadic lifestyle. Keegan (1989) has challenged this claim, noting that permanent village sites have been found in these areas, and that some claims by the Spanish were likely dubious or erroneous. While this issue has still not been clarified, for the purposes of this paper, I use "Ciboney" in reference to scholarly papers that have used this term in the past.

9 The samples derive from three different sites: Perico I cave ($n = 37$), Mogote La Cueva ($n = 3$), and Canimar ($n = 7$). While all of these sites have associated radiocarbon ages, ranging from $1990 \pm 50$ $^{14}$C yr BP, 1620 $^{14}$C yr BP, and $4700 \pm 70$ $^{14}$C yr BP, respectively, much of these data were recovered 40–50 years ago and the dates and/or excavation reports remain mostly unpublished. As such, it is unclear what kinds of samples were tested and whether these age ranges accurately reflect the age of the individuals whose mtDNA was sequenced. Given this chronological ambiguity, it would be useful to obtain direct dates from each specimen using more advanced pretreatment procedures for human bone.

10 This was something also noted by Siegel (2013) in his review of 952 papers published in the *Proceedings of the International Association for Caribbean Archaeology* (IACA) over the last 50 years, which focused primarily (27.2%) or secondarily (25.9%) on time–space systematics.

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