An initial archaeological reconnaissance of Anegada, the only low-lying coral and limestone island in the Virgin group, yielded information about two pre-Columbian midden sites and other anthropogenic features of probable pre-Columbian age. Of additional note is an absence of sites along Anegada’s coastline. This apparent anomaly seems to be a product of the island’s highly dynamic geomorphology. Possible reasons for pre-Columbian activity on Anegada are discussed, and directions for future research are suggested.

Anegada (Figure 1), the northeasternmost of the Virgin Islands, is a largely flat limestone and coral atoll that lies 25 km north-northeast of Virgin Gorda and 33 km northeast of Tortola, the administrative center of the British Virgin Islands. An archaeological reconnaissance of Anegada, conducted in July and December, 2002, resulted in the discovery of two pre-Columbian midden sites; location of a series of distinctive if not unique pre-Columbian conch shell platforms; identification of natural resources that may have attracted Native American immigrants to Anegada in prehistory; and recognition of geomorphic processes that may have been responsible for the limited surface visibility of pre-Columbian sites on the island.

Anegada has been visited briefly by archaeologists on two previous occasions. In 1937, Herbert Krieger, with an accompanying entourage, visited the island for "a few days" to investigate reports of "a large shell mound" (Krieger 1938). Krieger reported that the mound of conch shells, located "near the eastern end of Anegada," was measured (although measurements are not presented in his report), and he published a photograph of it (Krieger 1938:97). Krieger stated, however, that the mound was not excavated because it was "devoid of any cultural material other than the discarded conch shells" (1938:98). Krieger (1938:98) also reported that he recovered "pottery, shell, and polished stone implements gathered at random from the surface" in a brief survey of other areas of the island, but he gave no indication of the locations of those finds, nor did he indicate whether they came from an identifiable site, or were isolated surface finds.

In 1974, Jeffrey Gross and Alfredo Figueredo spent three days on Anegada. They located and published brief descriptions of two "shell heaps" near the eastern end of the island, including the mound described by Krieger (Gross 1975). Shallow test pitting of an area near one of the shell piles yielded "several sherds" which were generally non-diagnostic although, in the judgment of Gross and Figueredo, the pastes were reminiscent of
"Elenoid series" pottery from Puerto Rico and the Virgin Islands. Two conch shells from the associated midden deposit were taken as radiocarbon samples; these yielded a date reported as AD 1245 +/- 80 (Gross 1975:15). Gross and Figueredo did not find pottery in the shell heaps themselves, and their reconnaissance did not extend to other areas of the island.

The only other record of previous archaeological work on Anegada takes the form of a private collection of pre-Columbian artifacts that was obtained some years ago by Mr. Wilfred Creque, an Anegada resident, from an undocumented locality in the island's remote and unsettled East End. The several hundred artifacts in that collection include a variety of undecorated ceramic body sherds; two rims bearing anthropomorphic adornos (human faces); two conch shell adzes; and some 15 ground and polished stone adzes manufactured on various fine-grained volcanic rocks.

With an area of 39 km$^2$ and a population of approximately 180, Anegada is the second largest but the least populated and most remote of the British Virgin Islands. With a maximum elevation of 8.5 m, the topography of this "drowned land," as the Spanish named it, presents a sharp contrast with the much higher volcanic and metamorphic islands that comprise the rest of the Virgin group. Like the Outer Leeward Islands to the south, Anegada's low topography and coral/limestone bedrock derive from its location at the northeastern edge of the Caribbean tectonic plate (U.S. Geological Survey n.d.).

Although Anegada is characterized by poorly developed soils, low rainfall, and relatively sparse (primarily scrub) vegetation (Figure 2), its distinctive geology provides certain resources that would have been valuable for pre-Columbian inhabitants. Unlike many other low-lying islands in the northeastern Caribbean, Anegada has a readily available supply of fresh water, which occurs in natural wells in the exposed limestone (Schomburgk 1832). Fresh to slightly brackish (but potable) water can also be obtained from shallow hand-dug wells in the sandy soils near the coastline (Schomburgk 1832) (Figure 3, this paper). Although much of Anegada is marked by exposed limestone or coral bedrock, or by sand, limited areas of shallow organic soils do occur in the eastern third of the island. Indeed, in the early and mid 20th century, cotton, bananas, and sugar cane were produced in that area by the small resident population (B-V-I Guide n.d.). The island also possesses a wealth of marine resources in its shallow offshore waters. Lobsters, conch, and a wide array of other shellfish and bonefish are abundant, particularly near Horseshoe Reef, which, with a total length
of 51 km, is the world's third largest barrier reef (British Virgin Islands n.d.).

The Reconnaissance

Our eleven-day reconnaissance was aimed at determining whether any substantial evidence of pre-Columbian occupation could be found on Anegada. In keeping with most preliminary investigations of this kind, limitations of time did not allow for a systematic survey of the entire island, nor a stratified survey of selected habitats. Instead, we focused on areas that seemed most likely to contain evidence of

Figure 2. The interior of Anegada is dominated by scrub vegetation.

Figure 3. Western portion of Anegada in 1832. From Schomburgk (1832).
middens or other occupation refuse, covering as many of those areas as we could reach by pedestrian survey given the limitations of time. During the course of the reconnaissance, we completed a pedestrian surface survey of the southern shore of Flamingo Pond (Figure 1); the northern shore of the unnamed pond to the southwest of Budrock Pond; the southeastern shore of Budrock Pond (including the location of Anegada I; see Figure 1 and below); the western half of the southern coast; the western end of the island; the coastline of Loblolly Bay (on the north coast to the northeast of the airport); and an area of approximately 0.5 km$^2$ immediately to the east of The Settlement (including the location of Anegada II; see Figure 1 and below).

Archaeological reconnaissance in the West Indies typically is guided by the results of previous investigations on other islands. However, this procedure cannot be readily applied to Anegada. Although a great deal of archaeological research has been completed elsewhere in the Virgin Islands and in the northern Lesser Antilles, many of the landforms and habitat types that are common on those islands are absent on Anegada. Several of the landform types that have figured prominently in characterizations of pre-Columbian settlement patterns on other small islands in the eastern Caribbean -- particularly valley bottomlands with good agricultural soils and access to fresh water, deep bayheads, and small peninsulas (e.g., Davis 1988; Haviser 1990, 1997) -- are absent on Anegada (most bays on the island are merely slight indentations in the coastline). In short, settlement pattern models developed on higher islands are largely inapplicable on Anegada.

Looking somewhat farther afield, the Bahamas, with their limestone and coral bedrocks, low terrain, and relatively undifferentiated interiors, would seem to offer better guidance. Assessing the results of some 40 years of archaeological survey in the Bahamas, Keegan stated that:

These surveys have identified a predominantly coastal orientation of settlement. More specifically, Lucayan sites tend to be restricted to leeward sand beaches adjacent to shallow marine grass flats ... Because previous studies have shown that Lucayan settlements were usually restricted to coastal habitats, these locations have been the focus of most research efforts (Keegan 1992:68).

This general preference for coastal localities is consistent with other islands in the Virgin group, and most islands in the Lesser Antilles, where the vast majority of pre-Columbian sites, especially before and after the early Ceramic Age, are located within a few hundred meters of the coast; indeed, many sites on those islands are situated less than 100 m from the shoreline. On Anegada, however, our examination of numerous areas along and near beaches yielded no evidence of pre-Columbian human activity. The contrast with other islands in the Virgin group, as well as with the Bahamas, is striking. On high islands like St. John and St. Thomas (e.g., Bullen and Sleight 1963; Brewer and Hammersten 1988), pre-Columbian sites can be found on or just behind the beaches at the head of nearly every major bay. Indeed, the importance of the sea for transportation and as a food source were excellent reasons for pre-Columbian peoples to live in close proximity to the shoreline.

The apparent absence of sites in coastal locations on Anegada may be a product of natural post-depositional processes rather than pre-Columbian settlement patterns. Even in historic times, storm surges and wave action have significantly altered the Anegada coastline. Local informants report the deposition of more than a vertical meter of sand at coastal locales by a single hurricane. Shoreline loss has also been extensive. Following the passage of Hurricanes Gabrielle and Hugo in 1989, 15 horizontal meters of beach was lost on Anegada's north shore at Loblolly Bay, while Cow Wreck Bay, also on the north shore, gained over 30 meters. On the south shore, over 15 m of beach was lost at the Anegada Reef Hotel, and over 32 m were lost at Nutmeg Point (UNESCO n.d.).
Anegada is not unique in this regard; similar and even greater amounts of beach loss occur during major hurricanes elsewhere in the Virgin Islands (UNESCO n.d.). At Cinnamon Bay, St. John, an undetermined but extensive portion of a late pre-Columbian beachfront site has washed into the sea as a result of scouring produced by hurricanes (Kenneth Wild, personal communication, July 2000). Also on St. John, the presence of a deeply buried preceramic site at Lameshur Bay (Wild 1989) attests to the deposition of substantial amounts of sand on beaches, presumably by storm-driven waves. Yet many pre-Columbian beachfront sites elsewhere in the Virgin Islands remain visible to surface examination. Since Anegada lacks deeply indented bays, it may be subject to greater reworking of the coastline during hurricanes. An 1832 map of the island by German-British explorer R.H. Schomburgk (Figure 2) provides some evidence in favor of this hypothesis. Schomburgk's map clearly shows that the western salt ponds, now separated from the ocean by over 100 m, were connected to the sea on the south shore when Schomburgk visited the island in 1831. Schomburgk (1832:158) reported that "there was likewise [a connection to the sea] on the northern side, but the hurricane of 1819 stopped its passage." He also stated that

The western end of the island has been covered with sand, forced forward by an immense ground sea or surf, to which it is still subjected from time to time, and hence the continual change of the figure of the bays in that part ... The whole north side is exposed to an impetuous sea, but mostly on the northwestern part, where the sand has formed little hillocks of 40 feet in height. Behind the first range is a second and a third (Schomburgk 1832:157).

In addition, over a hundred years earlier, Pere Labat noted that substantial areas of Anegada were invaded by the sea at high tide (Labat 1970:205). Finally, although direct reports from Anegada appear to be non-existent, tsunamis would have exerted significant impacts on such a low island. For example, in 1867, an earthquake in the Anegada Trough between St. Croix and St. Thomas generated a tsunami that affected the entire West Indies east and south of Hispaniola. In Charlotte Amalie, St. Thomas, a wave 4.5-6 m high killed 12 people and swamped many boats. At Roadtown, Tortola, waves some 1.5 m high destroyed houses, and damage was experienced as far south as the Windward Islands (Lander, Whiteside, and Lockridge 2002). Evidence of potentially significant loss of pre-Columbian sites through natural post-depositional processes has been documented on other islands (e.g., Crock 2000; Delpuech et al. 1999). Because of Anegada's low topography and lack of enclosed harbors that could afford some protection from catastrophic events like tsunamis and major storms, the opportunities for both scouring and burial of archaeological sites appear to have been greater than on many other West Indian islands.

In light of the abundance of salt that is available from the ponds on Anegada during dry months, and the consequent possibility that indigenous people from other islands may have periodically extracted this resource from Anegada, close attention was paid to these landforms. Settlement around salt ponds has been reported from a number of other islands in the West Indies (e.g., Delpuech et al. 1999; Hofman et al. 1999; Nokkert et al. 1995; de Waal 1999). Approximately 5.8 linear km adjacent to salt ponds were examined on Anegada, but there was no indication of pre-Columbian human activity along the immediate pond shorelines. It should be noted, however, that both of the pre-Columbian sites that were identified during the reconnaissance (see below) are situated within 100 m of salt ponds; indeed, both sites are located on the closest firm, well-drained land to the nearby ponds. Sullivan (1981) suggested that certain Ceramic Age sites in the vicinity of salt ponds in the Bahamas were salt collection stations. We are, of course, not in a position at this stage to suggest whether either or both of the pre-Columbian sites on Anegada served a similar function.
Sites

The first of two sites found during the reconnaissance, Anegada I, was located with information provided by a local resident who reported finding "Indian artifacts" in the East End "years ago." The informant described the site's location as east of Budrock Pond on land with "soil and trees." By "soil," we learned, the informant referred to dark organic soils, which are virtually absent on Anegada outside of archaeological sites. Indeed, trowel tests indicated that Anegada I consisted of 9-22 vertical cm of dark midden sitting directly on top of limestone bedrock.

Anegada I is located at and around 18º41.855' N and 64º16.706' W. The site is situated at an elevation of about 5 m on a low hill that overlooks Budrock Pond (Figures 4 and 5), which is some 40 m west of the site. Midden soil formation is adequate to support a number of broadleaf trees, which are exceedingly rare elsewhere on the island. The site surface is littered with shell and a fairly low density of potsherds, as well as fish and other bone.

Midden and artifacts were encountered over an area of approximately 45 x 30 m.

In addition to shell and animal bone, 25 potsherds were recovered from Anegada I. Two are rim sherds, and one of those is decorated with broad arching curvilinear incision reminiscent of late Ceramic Age ceramics from elsewhere in the Virgin Islands and Puerto Rico. That sherd and four of the body sherds contain a light-colored grit temper that appears to be plagioclase feldspar (a material that is absent in the carbonate bedrock of Anegada). The other rim sherd and the remaining body sherds have no apparent temper, and are relatively thin with homogeneous pastes.

A noteworthy artifact in the surface collection from Anegada I is a large mid-shaft fragment of a ground stone artifact, probably either a pestle or an ax. The raw material is diorite, a volcanic rock that is present in the East End range on Virgin Gorda (University of the West Indies n.d.) but absent on Anegada. The specimen weighs 425 g and measures approximately 8.3 cm x 7.4 cm x 1.9 cm.
Together with the feldspar tempered pot sherds that we collected and the ground stone adzes in the collection of Mr. Wilfred Creque (see above), this artifact provides evidence of pre-Columbian ties between Anegada and islands to the west or south.

Only three species of shell were observed at Anegada I: *Codakia orbicularis*, *Strombus gigas*, and *Nerita tessalata*. A variety of fishbone, including several specimens of parrotfish (Scaridae) were also found, as well as five fragments of bird longbone that have yet to be positively identified, but that may represent roseate flamingo (*Phoenicopterus ruber*) or another large bird.

Anegada II was found on the last day of the reconnaissance. The site is located at and around 18º43.048' N and 64º18.799' W, near the outer southeastern edge of The Settlement. As with Anegada I, the site was marked by dark midden soil that contrasted sharply with the surrounding sands, corals, and poorly developed limestone soils. The density of pre-Columbian artifacts at Anegada II was extremely low; our collection consists of one undecorated rim sherd, three undecorated body sherds, and an articular end of a mammalian long bone that appears to be manatee. Only the mammal bone was found in a buried context. Also present on the site were various early and middle twentieth century artifacts that apparently were associated with an abandoned homestead. The midden soil ranges in depth from eight to over 30 cm.

Perhaps the most enigmatic anthropogenic features discovered during the reconnaissance was a series of three conch shell (*Strombus gigas*) platforms (Figure 6) that are located in the East End near White Bay and the southeastern shore of Shell Pond, about 400 m southwest of Anegada I. Limitations of time did not allow full mapping of these unusual features, each of which consists of thousands of conch shells. Unlike the large piles of opened conch of colonial and modern age that can be found in nearshore waters near The Settlement, the conchs in the platforms are heavily weathered and oxidized to a dark blue-gray color. The platforms are flat-topped, approximately 50 cm high, very roughly rectangular in plan form, and
range in area from approximately 70 m$^2$ to 130 m$^2$.

Residents of Anegada today regard the conch platforms as part of an "Indian burial ground," and that idea itself has considerable antiquity. Mr. Wilfred Creque of Anegada has a map dated June 10, 1824, entitled "A Chart of the Islands of Anegada, Together with the Vessels Wrecked Upon Them" (produced by Charles Noyce for the Queen's Quartermaster's Office) bearing four triangles in the location of the shell platforms. The triangles are labeled "Pyramids of Conch Shell Left by [word obscured] Indians."

Large accumulations of presumably prehistoric conch were observed in the early 1830's by German-British naturalist R.H. Schomburgk (Figure 7), who wrote that [Anegada] as an occasional rendezvous, where they procured great quantities of conchs (*strombus gigas*); and large piles of these shells are still to be seen at the east end of the island, but nowhere else; which seems to prove decidedly that it was not permanently occupied, but merely resorted to from time to time ... the dry shells piled up all have a hole in the lower end of the spire, for which the most probable reason is, that the animal is thus most easily extracted. It appears surprising that so much care has been taken to pile them up, and it has been surmised, in consequence, that these heaps were burial-places; but several have been taken down, and burnt for lime -- without any trace having been found of human bones, or other extraneous substance. And it is more probable that they were merely piled up to be out of the way, the current not being strong enough to carry them off had they been thrown into the sea;
where, had they remained, they would have embarrassed the fishing for the living animal (Schomburgk 1832:153).

The conch platforms that we visited do not appear to be the same "shell heaps" that were investigated by Krieger (1938), or Gross and Figueredo (Gross 1975). The higher of the two shell piles examined by Gross and Figueredo, which they identified with the mound visited by Krieger, was reportedly 2-3 m high, covering an area of about 200 m², making it both higher and more extensive than any of the three platforms we visited. Indeed, we identified a conch pile of roughly that dimension some 300 m east of the conch platforms, at 18º41.438' N and 64º16.643' W. Moreover, none of these authors noted that the mounds or heaps they examined were uniformly flat-topped. Further, Gross reported that at least one of the two piles they examined consisted of "whitened conch," whereas the platforms we saw were each composed of blue-gray, highly oxidized, shell. The color is notable; in our experience, shell typically weathers to a bright white color, and the blue-gray color of the shell in the platforms suggests the possibility that they were either burned or covered with earth for some period of time. The functions of all the presumably pre-Columbian conch accumulations on Anegada, whether as substructures of some sort, adjuncts of burial or other ritual activity, or merely as dumps for harvested Strombus shells (however carefully discarded), remain undetermined.

Questions and Potential for Future Research

In comparison to many other islands in the Virgin group and the Lesser Antilles, Anegada has thus far yielded only limited evidence of pre-Columbian occupation. Nevertheless, Anegada is intriguing for both substantive and methodological reasons. While our reconnaissance was not a comprehensive systematic survey, we did achieve a level of coverage that undoubtedly would have yielded more archaeological data on any number of other islands. These results suggest either that (as Schomburgk [1832] speculated) Anegada was visited only sporadically by pre-Columbian people from other islands; or that Anegada has experienced a high rate of archaeological site loss and/or concealment from storm action, normal tidal activity, and along shore currents.
While Anegada may have been a special procurement locality for conch, the uniform heights of the shell platforms, and the highly oxidized condition of the shells, suggest some activity additional to meat extraction. This question needs to be investigated through disassembly and careful recording of portions of the platforms, and through excavation of areas beneath the shells. In addition, of course, additional radiocarbon analyses of the shells should be conducted to ascertain their pre-Columbian age and the range of time that they represent.

The small collection of artifacts and food remains recovered from Anegada I is consistent with a habitation site, possibly of late pre-Columbian age. Although the site's remote location some seven km from the nearest road creates logistical challenges, further testing could document the presence of pre-Columbian settlers, as opposed to visitors. Anegada II should also be tested with the same question in mind.

It seems highly likely that the dynamic coastal geomorphic environment of Anegada has significantly affected our current view of the island's pre-Columbian archeological record. Deep testing of beaches and adjacent coastal areas through an augering program is theoretically possible, but would be highly time-intensive with little clear prospect of success. However, a more thorough survey of inland areas within 100 m of salt ponds, and of areas containing natural fresh water wells, should be undertaken with specific attention to identifying organic soils that may represent archaeological middens.

Pre-Columbian inhabitants of other Virgin Islands, especially Virgin Gorda and Tortola, clearly were aware of the existence of Anegada, and it is equally clear that indigenous people visited and almost certainly settled on the island for at least some period in prehistory. Rainfall is low and Anegada's weakly developed soils appear poorly suited to agriculture. Indeed, they are so shallow that it is difficult to imagine successful cultivation of a root crop like manioc, resistant as it is to drought and fluctuations in rainfall. However, certain other resources are bountiful. In addition to the island's rich fishery and the availability of fresh water, in prehistory, roseate flamingos and rock iguanas, severely reduced in numbers during historic times, were abundant, and salt has been a readily available resource from prehistoric through modern times. We hope that more detailed investigations in the future will be able to determine which of these, or other, resources drew and sustained pre-Columbian inhabitants to this most distinctive of the Virgin Islands.

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Notes

1 Local fishers report that, if freshly cleaned conch shells are discarded in the sea, living conch will in fact abandon the area. This behavior may be a response to an increase in conch predators such as horseshoe crabs in conch discard areas (Julie Gauthier, personal communication, December 2002).
Plum Piece
Evidence for Archaic Seasonal Occupation on Saba,
Northern Lesser Antilles around 3300 BP

Corinne L. Hofman
Menno L.P. Hoogland

Recent investigations on the island of Saba, northern Lesser Antilles, revealed evidence of preceramic occupation in the northwestern part of the island at an elevation of approximately 400 m above sea level. The inland location of dense midden deposits in a tropical forest environment makes the Plum Piece site unique for studying the preceramic occupation of the Antilles, a period that is otherwise mainly known from coastal settings. The recovered artifacts and the radiocarbon dates support an attribution to the Archaic period of the preceramic Age. The nature of the tools and the restricted number of exploited food sources suggest a temporary, probably seasonal, occupation of the site for a unique activity.

Archaeological investigations on the island of Saba, northern Lesser Antilles (Figure 1) during the summers of 2001 and 2002 revealed evidence of preceramic occupation at the site of Plum Piece in the northwestern part of the island dating from approximately 3300 BP. Prior to these investigations a preceramic date of 3155±65 BP had been obtained from the Fort Bay area in the northeastern sector of Saba (Roobol and Smith 1980). This date came from a shell adze with a poor context. No additional proof was ever found for preceramic occupation in that area, or elsewhere on Saba, except for some isolated stone tools reported from the interior of the island and two flint blades recovered from construction activities at The Level in Windwardside. In contrast to the limited data on the preceramic occupation of Saba, Ceramic Age settlements are known from along the north and southeastern side of the island dating between approximately AD 400 and 1400 (Hofman 1993; Hoogland 1996).

Contemporary preceramic sites and tool assemblages comparable to Plum Piece are known from other northern Lesser Antilles, but most are from coastal settings. Faunal assemblages in these sites point to a focus on coastal exploitation in which shellfish predominates. The species collected are related to the exploitation of specific coastal environments, varying from mangroves to shallow-water and shallow-reef habitats.

The atypical location of the site of Plum Piece in the tropical forest area of Saba at an elevation of 400 m above sea level provides another picture. The dense midden deposits consist mainly of landcrab and bird remains, though fish and especially mollusks are present in very small quantities. The restricted variety of exploited food sources suggests a temporal and seasonal occupation of the site. The tool assemblage at Plum Piece is similar to the Archaic preceramic complexes known from nearby islands defined by Rouse (1986, 1992) as the Ortoiroid series dating between 5000 and 1000 BP. Rouse suggested a northern South American origin for the Archaic groups of the Lesser Antilles because of the close resemblance in toolkits between the mainland and the islands. Tools at Plum Piece include stones for hammering, pounding, battering and grinding, shell adzes, and large quantities of flaked-flint tools. Other remains are comprised of coral and ochre.
The remote location of this site, the restricted exploitation of food sources, the character of the tools and the provenance of the materials used for their manufacture are expected to provide interesting and new perspectives on choices of settlement location, and on a more general level, on the lifeways, mobility and interaction patterns of the Archaic peoples of the Lesser Antilles.

**The island of Saba: geomorphology and land use**

Saba is situated at 63° 14' W, and 17° 38' N, approximately 50 km south of St. Martin and 30 km north-west of St. Eustatius. The island of St. Croix, U.S. Virgin Islands, lies 80 km in a westerly direction.

Saba is one of the smaller islands of the Lesser Antilles and has a surface area of only 13 km² (Figure 2). Its small surface area, the pronounced relief, which leads to a slightly higher level of precipitation than the surrounding islands, and its difficult access, give Saba an exceptional and unique character.

The island is the upper part of an extinct Pleistocene volcano, which rises steeply from the seabed from a depth of 600 m. The summit, Mount Scenery, stands 870.4 m above mean sea level (amsl) and is often cloaked in fog. The
Outlines of the volcano attest to a complex structure. The summit of the island is situated in the middle and is enclosed by numerous smaller peaks. There is only one large relatively flat area, which is the location of the main village, The Bottom. The villages of St. John’s and Windwardside are situated on other relatively flat areas. The majority of the island has slopes of more than 15º, while along the coast they even exceed 45º.

The landscapes of Saba are strongly affected by erosion. Along the numerous radial steep-sided gullies or guts, rainwater flows into the sea. Steep cliffs characterize the coast all around the island. A gentler sloping coast occurs in the few inlets of bays, like Cove Bay and Spring Bay on the windward side of the island. But here, heavy breakers on the boulder beach hamper access from sea. The leeward side of the island offers a good anchorage at Ladder Bay and Well’s Bay, but the shore is very steep.

Due to the relief of the island the climate can be subdivided in three meso climates. Based on temperature and precipitation the lower elevations (0 - 450 m) can be classified as a savannah climate. Between 450 and 800 m there is a tropical rainforest climate with a dry season. On the higher elevations there is a tropical rainforest climate (Augustinus et al. 1985:2).

Today the vegetation of Saba shows a zonation more or less parallel to these climatic zones. The vegetation of the low areas up to 350 m can be described as either Croton thickets, dry evergreen woodland or secondary woodland. From 350 to 650 m the vegetation consists of secondary rainforest with some species reflecting the remnants of the original forest. Treefernbrake and palmbrake1 are the vegetation of the higher elevations, while elfin woodland is characteristic for the summit above 825 m (Stoffers 1956; Augustinus et al. 1985).

In pre-Columbian times the area between 350 and 650 m amsl was presumably covered by rainforest.

Colonial and more recent land-use has modified the original landscape and vegetation of Saba in many respects. In the past, the landscapes of Saba were mainly impacted by activities related to agriculture and cattle grazing. Today, the most important threats are goats and the destruction and degradation of habitat caused by unregulated development in general.

Historic ruins and agricultural terraces are encountered all over the island suggesting intensive occupation during the first half of the 20th century. The present day habitation centers only along the western side of the island. The eastern side has been desolate since the mid-twentieth century when the last inhabitants of

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1 Treefernbrake forms dense groves, about 4 m high, almost solely of Cyathea arborea, Cyathea grandifolia and sometimes also Cyathea muricata. Palmbrake consists mainly of Euterpe globosa (Augustinus et al. 1985:61-62).
Mary's Point moved to The Bottom and Hell's Gate. Most of the present agriculture is practised in the zone between 350 and 650 m on scattered, small-cultivated plots all over the island. On the eastern side such cultivated plots constitute the only remaining activity.

Pre-Columbian occupational history and cultural chronology

Saba's occupational history and cultural chronology has been defined on the basis of several archaeological investigations carried out by Josselin de Jong in 1923 (1947), Haviser during the mid-eighties (Haviser 1985) and Hofman and Hoogland between 1987 and 1992 (Hofman 1993; Hoogland 1996; Hoogland and Hofman 1993, 1999). Except for the find of four shell tools with a preceramic date suggesting an occupation of the island at around 1000 BC (Roobol and Smith 1980) and the recent discovery of Plum Piece, Saba's pre-Columbian occupational history is limited to the ceramic period (i.e., between AD 400 and 1400). Saba appears to have been inhabited for the first time by Ceramic Age people during the late phase of the Early Ceramic Age (i.e., around AD 400) as is evidenced from the sites of Spring Bay 1a and Kelbey's Ridge 1. Ceramics from this period are characterized by traits of the Cedrosan Saladoid subseries. The major period of Saba's pre-Columbian occupation is situated between AD 800 and 1200 (i.e., the early phase of the Late Ceramic Age), as is evidenced by the The Bottom, St. John's and Spring Bay 1b, 2 and 3 sites. Ceramics from these sites belong to the Mamoran Troumassoid subseries. The sites of Spring Bay 1c and Kelbey's Ridge 2 provide occupation evidence for after AD 1200. In accordance with the regional settlement pattern, a decline in sites is noticeable during this period. Ceramics from the Spring Bay 1c and Kelbey's Ridge 2 show affiliations to the Chican Ostionoid subseries of the Greater Antilles, dating to ca. AD 1200-1500 (Hofman 1993).

Test excavations at Plum Piece

Plum Piece is situated in the northwestern part of the island, on the leeward side (Figure 3). This part of the island is densely vegetated today which hampers the view and restricts the discovery of pre-Columbian sites during field surveys. The plot of land on which the site is situated was cultivated during colonial times, as is testified by the presence of terraces. The land is currently under cultivation of root crops. The landowner, Mr. Carl Zagers, discovered and reported the presence of Amerindian tools while working his land.

A survey during the summer of 2001 confirmed the presence of an Amerindian occupation at Plum Piece through the recovery of numerous pieces of flint and ground-stone and shell tools from the surface. In addition, a large in situ grinding stone was identified at the site (Figure 4).

Two test pits measuring 1 x 1 m were dug to investigate the presence and depth of eventual cultural deposits. It appears that the site was partially disturbed by hundreds of years of cultivation and by the construction of the terraces. Fortunately, the cultivation of root crops did not exceed 40 cm in depth, resulting in restricted damage to the underlying rich archaeological deposits.

During the 2002 campaign an additional 7 m² were excavated to obtain a better insight into the stratigraphy of the deposits and to collect a sample of material and faunal remains (Figure 5). The units were dug in 10 cm arbitrary levels

![Figure 3. View of the Plum Piece site situated 400 m amsl. Below is Well's Bay.](image-url)
taking into account changes in the stratigraphic layers. The material was dry sieved through a 6.4 mm (1/4") mesh. A sample from one 1 x 1 m unit was water screened through a 3.2 mm (1/8") mesh to obtain an adequate sample for faunal analysis and to collect flint chips.

The archaeological deposits encountered during the two campaigns consist of dense midden deposits composed of vast quantities of faunal remains intermixed with a number of flint, ground-stone and shell tools, coral (*Arcopora palmata*) fragments and red ochre.\(^2\)

The stratigraphy shows a dense midden layer reaching a depth of 50 cm in some parts covered by a disturbed humic plowzone mixed with charcoal varying in thickness from 10 to 40 cm (Figure 6). The latter is the result of charcoal burning at the site during colonial and recent times. Charcoal holes with a diameter of 30 cm penetrate the midden deposits in some areas.

Three radiocarbon dates of landcrab samples from undisturbed midden contexts have provided dates of 3430 ± 30 BP (GrN-27562), 3300 ± 30 BP (GrN-27563) and 3320 ± 30 BP (GrN-27564). Calibrated at a 2 sigma interval the dates fall between 1875 and 1520 cal BC.

**Pre-ceramic subsistence economy and toolkit**

Preliminary results of the faunal analysis carried out by graduate student Peter van den Bos supervised by Dr. Thijs van Kolfschoten of the zooarchaeological laboratory, Faculty of Archaeology at Leiden University point to a fairly restricted exploitation of food sources in the vicinity of the site. The abundance of exoskeletal fragments of landcrabs and bird bones in the deposits indicates a heavy reliance...
on terrestrial faunal sources. Fish and shellfish remains are well preserved in the deposits but are scarce and seem to have been of minor importance in the diet of the preceramic occupants of Plum Piece. The presence of conch lip adzes suggest that the inhabitants of Plum Piece likely captured and ate conch, though they probably extracted the meat down at the beach and did not take the shells up to the site.

The mountain or black crab (*Gecarcinus ruricola*) dominates the faunal assemblage. The mountain crab is a frugivorous species, foraging nocturnally and hiding under debris in the forest and rocks during daytime. This species occurs at high elevations on the island but is endangered today through modern-day hunting. Generally, they are harvested during breeding migrations when they migrate to the seashore to spawn. The second species of crab present in the assemblage, though in minor quantities, is the soldier crab (*Coenobita clypeatus*), a purple-clawed hermit. This species, however, could have been foraging on the refuse deposits and as such be no part of the Amerindian diet.

Next to the land crab species, there is also evidence of a reliance on birds. Most, if not all, of the recovered bird bones belong to the Audubon’s shearwater (*Puffinus lherminieri lherminierii*), a breeding visitor to Saba (Figure 7). The bird breeds on the island during a limited period of the year (i.e., between February and July). The shearwater, or ‘wedrego’ as it is called today, is a small, long-tailed pelagic bird, approximately 30 cm in length. The bird is dark blackish-brown above and white below, but with dark undertail coverts. Today, they are found at night in nesting colonies or during the day far out to sea over deep water. They return to land only for the breeding season. The adults will leave the nests at nighttime, which is the only time that they can be found throughout the island. Nests are located in cliff crevices, caves, under vegetation, under rocks, or the birds will dig a burrow 60-90 cm in length. The lays consist of one white egg.3

Potential nesting habitats can be found throughout Saba. These birds are known to breed in sheltered places in the higher parts of the island (Voous 1955). The restricted period during which the Audubon’s shearwater breeds on the island might point to a seasonal occupation of the site related to the breeding season of these birds.

Tools are made of flint, other stones and shell. The functional analysis of the different artifact categories is being carried out in cooperation with Dr. A. van Gijn of the Artifact Laboratory of the Faculty of Archaeology at Leiden University.

The flint artifacts are being studied by graduate student Iris Briels. The assemblage consists of more than 700 pieces of flint, of which the majority has a Long Island, Antigua, provenance (Knippenberg, pers. comm.). The majority of the flint assemblage is characterized

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3It is estimated that there are 3000 to 5000 pairs in the West Indies today of which a large number, around 1000 pairs, come to breed on Saba (EPIC 2003).

Figure 7. Audubon’s shearwater (*Puffinus lherminieri*) (top) and its archaeological remains.
by unretouched whole flakes (with striking platform, bulb of percussion and an intact distal end) of irregular sizes and most often without cortex (Figure 8). Some of the flakes are long and have a blade-like appearance. Prepared blade cores are absent. There is no evidence of blade production at the site. However, the large quantity of waste-material in the form of very small flakes and flake cores points to an expedient flake technology.

Freehand percussion was used for the flaking. The bipolar technique used for flint knapping at Ceramic sites on Saba was not employed by the Archaic people. Flake production seems to be better controlled than during ceramic times. Currently a use-wear analysis program is being carried out in order to identify traces of use and define the possible function of the flint artifacts. Experiments have been carried out on wood, fish, fibers, grasses, reed, calabash and cultigens.

Other stone artifacts include tools for hammering, pounding, pecking and grinding made of volcanic rocks locally available along the shoreline below Plum Piece (Figure 9). Twenty *Strombus gigas* artifacts were recovered from the midden deposits, including about twenty ground shell adzes (Figure 10a-c). All specimens have a length of between 15.0 and 18.9 cm. The tools have either rounded or squarish edges. A number of blanks and lip fragments were recovered as well, while other parts of the shell and whole conch shells were absent from the site.

**Plum Piece in a regional context of the Lesser Antilles**

The preceramic Age is still not very well known for the Lesser Antilles and the virtual absence of sites from this period in the southern part of the Antillean archipelago still poses many questions regarding the origin of these peoples. Several preceramic sites are known, however, from the Leeward Islands and can be dated to the Archaic Age (i.e., between 2000 and 400 BC). From north to south these are Krum Bay, St. Thomas (Figueroedo 1974; Gross 1976; Lundberg 1989); Whitehead’s Bluff, Anguilla (Crock et al. 1995), Norman Estate (Knippenberg 1999; Nokkert et al. 1995) and Baie Orientale (Bonnissent et al. 2001; Serrand 2001), St. Martin, Corre Corre Bay, St. Eustatius (Versteeg, pers. comm.), Sugar Factory Pier, St. Kitts (Armstrong 1978, 1980; Goodwin 1978), Hitchman’s shell heap on Nevis (Wilson 1991), several sites on Barbuda.
Figure 9. Ground-stone artifacts (lower right specimen is 144 mm wide).

Figure 10. Ground shell adzes (*Strombus gigas*) (bottom specimen is 179 mm in length).
At this point Antigua appears to have been the most densely occupied island in the northern Lesser Antilles during preceramic times known until now. The Archaic settlements are all situated on the low-lying limestone plain along the northeast coast of the island (Davis 2000) and on Long Island, a tiny island situated just off this coast (Gijn 1993; Knippenberg 1995, 1999, 2001; Verpoorte 1993). The site of Jolly Beach, which is located on Antigua's west coast, is an exception. Marine food resources and easy access to the flint sources situated along the northeastern shore and on Long Island (i.e., Flinty Bay) probably determined preceramic site locations on Antigua (Davis 2000:93-94).

All of the above-mentioned sites are situated in coastal environments and rely heavily on fish and shellfish exploitation. Like Krum Bay, Norman Estate also shows high percentages of fish from reef habitats (Reitz 1989; Brokke 1999; Nokkert 1999; Nokkert et al. 1995). Dependency on a restricted number of species is a common feature of preceramic sites (Brokke 1999; Crock et al. 1995; Lundberg 1989). The variability of species between sites might be related to local availabilities (Keegan 1994:270), focused collecting strategies and site function (Lundberg 1991:74). According to Lundberg (1991:74) the location of the Krum Bay site in a small sheltered bay within good reach of fishing grounds and pearl oyster beds can be related to a focused collection strategy towards certain shellfish species and reef fishes and also to the exploitation of pearls during successive reoccupations of the site spanning more than a thousand years.

Archaic subsistence on Antigua was oriented toward shallow marine resources (i.e., mangroves, shallow muddy and sandy bottoms, and shallow rocky areas) (Davis 2000:91, 101). At Jolly Beach, shellfish exploitation was focused on about eight major species with smaller quantities of other species. In addition to fish from shallow marine waters and some turtle and manatee, Jolly Beach is the only site presenting a higher reliance on terrestrial fauna (i.e., lizards and birds) compared to other sites on Antigua's shore. The total absence of land crabs from the deposits at Jolly Beach is remarkable, for they were a common food source in all Ceramic sites on Antigua (Davis 2000).

Archaic northern Lesser Antillean assemblages comprise a combination of flint, ground-stone and shell work. The lithic technology can be considered poor and often based on flake instead of blade production. At Krum Bay, no flint was found, but fine-grained rock to produce flakes in a nonsystematic manner was recovered (Lundberg 1989). The Whitehead's Bluff site produced flint flakes (Crock et al. 1995), as did the site of Norman Estate. At both sites there is a total absence of blade production. The site of Jolly Beach on Antigua, where blade production predominates, forms an exception in the region. The existence of blade production at this site has been related to easy access to the sources and abundance of raw material on the island (Knippenberg 1995). In contrast, the dominance of flake technology, on islands distant from Long Island has been related to the fact that they were located far from the source area (Crock et al.1995; Knippenberg 1995).

The combination of flint, ground-stone and shell tools in the aforementioned sites fits the general picture of Archaic peoples of the Antilles defined by Rouse (1986, 1992) as the Ortoiroid series. Veloz Maggiolo (1976, 1980, 1991; Veloz Maggiolo and Vega 1982) describes these assemblages as a technological system that comprises a hybridization of flint, stone and shell technologies based on the Greater Antillean development of a particular economic adaptation. The Archaic occupants of the Lesser Antilles are regarded as fishers and foragers living semi-permanently in mostly coastal settlements and lacking pottery (Boomert 2000; Davis 2000; Keegan 1994). They are generally thought to have populated the islands from the south (i.e., coastal Venezuela through Trinidad and Tobago as far as eastern Hispaniola).
Lesser Antilles may have occurred from 5000-4000 BC onwards (Boomert 2000:78). In contrast, the western Greater Antillean preceramic cultures of the Casimiroid series were believed to have originated in a migration from Belize also around the fifth millennium BC (Callaghan 1990; Rouse 1992; Wilson et al. 1998). In a more recent publication Callaghan (2003) used computer simulations to explore the probable origins of the earliest preceramic cultures of the Greater Antilles and to get insight in the level of navigational skills, which are necessary for the colonization of the islands from South America, Central America and Florida. He concluded that navigation from northern Central America seems to require foreknowledge of the islands and from Florida the early navigators would have encountered considerable risk. Colonization from the mainland of South America seems to be most likely because of the lower degree of navigational skills involved. In addition, despite certain resemblances in manufacturing technology with northern Central America, many aspects of Belizean assemblages are not found in the Greater Antilles. The likelihood of a South American connection is also suggested by the results of ancient DNA analysis on skeletal samples from Cuban Ciboney (Lalueza-Fox et al. 2003).

Discussion and future research

The location of Plum Piece at a considerable height in the mountainous tropical forest region of Saba impedes comparisons with contemporary settlements in the Lesser Antillean archipelago that are all situated on the coast. For islands to the south of Antigua little information is available on Archaic settlements in similar remote inland locations. The majority of the finds from islands to the south include isolated ground-stone artifacts, which may reflect an ample presence of Archaic peoples in the Windward Islands that are not as yet pinpointed (Clerc 1976; Harris 1973; Keegan 1994:267; Sutty 1991). Two small sites, Boutbois and Le Godinot on Martinique are probably the only readily confirmed Archaic settlements in the interiors of the Windward Islands (Allaire and Mattioni 1983). To the north on the Greater Antilles, however, occupation of inland site locations such as river valleys and hills was common during preceramic times (Kozlowski 1980).

Plum Piece's faunal assemblage points to a temporal and seasonal occupation possibly oriented toward a set of special activities. The size of the actual habitation area cannot as yet be exactly determined, nor are there any precise indications of the occupation length. The depth of the deposits, however, suggests a recurrent occupation of the site by a single group. The composition of the midden deposits is indicative of a habitation by people focusing on terrestrial food sources. Plum Piece stands out because of the presence of huge quantities of crab remains and bird bones, thus far lacking from other sites in the region.

The large quantities of bones of Audubon's shearwater (Puffinus lherminieri lherminierii), which breeds on Saba only between February and July, suggest that this was the season that Plum Piece was occupied. The Gecarcinus ruricola and probably also the Puffinus lherminieri typically are caught at night when both species leave their nests and forage around the island. According to Goodwin (1978, 1979), landcrabs must have been an abundant protein source available at negligible risk and requiring...
little energy to capture (see also Davis 2000:90). Goodwin bases his hypothesis on the masses of landcrab remains found at Early Ceramic Age sites on St. Kitts.

The low numbers of fish bones and the nearly total absence of shellfish in the Plum Piece deposits is striking and indicates that little effort was put into the exploitation of marine sources and transport of fish and shellfish from the seashore to the mountainous camp site. This may be indicative of the fact that Plum Piece was occupied only seasonally alternately and complementarily with settlements in coastal locations on one of the nearby islands. The lack of a well-rounded suite of subsistence remains in Archaic coastal sites has been previously related to the fact that people might have moved between resource concentrations during different seasons (Lundberg 1991:76; Keegan 1994:270). Plum Piece, although differentiated by its location, material remains and subsistence strategies, may have belonged to one and the same subsistence/settlement system as these contemporary coastal sites (see also Lundberg 1991:75) and this would at the same time emphasize the highly diversified procurement strategies of the Archaic Amerindians (Boomert 2000:78).

The sizeable number of mortars and pestles available from the midden deposits suggests that the site occupants also placed an emphasis on the processing of seeds (and berries) to supplement their diet. Grasses and other plants providing edible seeds and fruits of all kinds but also fibers for the manufacture of baskets, mats and fish pots are present in the settlement's environment. It has also been suggested that certain plant species might already have been cultivated in so-called house gardens by Archaic people in the Antilles (Davis 2000:96; Newsom 1993; Newsom and Pearsall 2002). The preceramic peoples have long been regarded as pre-agricultural foragers, but paleobotanical studies have demonstrated that wild grains and fruits were already 'managed' or even cultivated during this period (Newsom 1993), suggesting that a Caribbean Horticultural Complex may have existed during the Archaic (Keegan 1994:270).

The lower slopes situated below Plum Piece are a suitable habitat for grasses and fruit trees such as papaya (Carica papaya), soursop (Annona muricata) and sweetsop (Annona reticulata), arrowroot (Maranta arundinacea) and tuna cactus (Opuntia spp.). Keegan (1994:270) provided a list of plants identified in other Archaic deposits in the Caribbean including zamia or coontie (Zamia debilis) and cupey (Clusea rosea), seeds of the Sterculia, sapodilla (Manilkara [zapota] sp.), wild avocado (Persea americana) and yellow sapote (Pouteria campechiana), primerose (Oenothera sp.), mastic-bully (Mastichodendron foetidissimum), trianthema (Trianthema protulaca), and palms (Palmae) (see also Davis 2000:93; Newsom 1993; Pearsall 1989; Rouse and Alegría 1990; Veloz Maggiolo and Rimoli 1976; Veloz Maggiolo and Vega 1982).

Grinding stones and mortars for plant processing as well as ground-stone tools for other activities as hammering and pecking are made from volcanic stones which had been carried up the mountain from the seashore where they are found in large quantities on the boulder beaches. The Well's Bay is located below Plum Piece and is characterized by such a boulder beach. Besides the fact that this might have been the landing place for the Plum Piece occupants, trips to the bay were probably made to procure these rocks but also to obtain conch to eat and for making adzes. Conch shells can still be found on the sea grasses situated to the north of Well's Bay. The absence of whole conch shells from the midden and the presence of unfinished lips and waste-products from the manufacturing process suggest that the meat was extracted and the shells were pre-worked at the shore. The lips then were taken to the site for further manufacturing into tools. The large in situ boulder with grinding platform might be
indicative of a shell tool atelier on the site.

With regard to the type of artifacts recovered and the site's location, woodworking for the building of dugout canoes might be one of the activities for which people would have chosen to temporarily settle in this mountainous tropical environment. It has been suggested that similar activities would have taken place at the inland sites of Martinique (see Boomert 2000:78). At those sites no food refuse was found, suggesting that they were visited only on a daily basis.

The flaked-stone industry, characterized by the presence of unretouched flakes at the site does not differ from most neighboring islands. Only the Jolly Beach complex on Antigua is oriented towards a direct-percussion blade industry along with flaking. The flaked flint artifacts from Plum Piece are predominantly made of Long Island flint. The nearly total lack of cortex suggests the direct procurement of the flint material and primary reduction at the source, in this case Long Island. Prepared cores were then transported to Saba where further reduction took place at the site.

The picture that emerges from the investigations at Plum Piece is that of a campsite occupied for the performance of specific activities (i.e., woodworking for the building of canoes during the spring season, February to July). This period coincides with the Audubon's shearwater nesting season and the spawning of the Gecarcinus ruricola. Procuring the shearwater and land crabs would have required a low energy input. The diet of the preceramic inhabitants of Saba was supplemented by root crops, fruits and grass seeds. The toolkit comprising ground-stone and shell tools and flaked flint artifacts, is at first glance not different from that described for contemporary sites in the region. None of the materials used for the manufacture of these tools are available in the site's environment and therefore must have been carried up the mountain from the shore.

The procurement, and in some cases preworking, of the raw materials elsewhere on the island (i.e., stone from the shoreline and shell from sea grass beds) and in the region (i.e., flint from Long Island) gives the impression that the Plum Piece dwellers consciously selected this remote location.

Future research on the site will be directed toward questions of settlement structure, a thorough analysis of the toolkit and study of the technological system. An in-depth study of the lithic technology and use-wear analysis on the stone and shell tools is expected to yield insights into the Archaic tool industry (including full sequences of core reduction) and function(s) of the chipped flint and ground-stone and shell artifacts.

Attention will also be directed toward the identification of plant remains for the reconstruction of a vegetable component in the diet, which may have formed an important supplement to the protein based diet heavily reliant on crab and bird. Besides further excavation of the midden deposits for these purposes, future fieldwork will focus on the potential presence of features such as pits and hearths in the area next to the midden. A field survey of the entire northern side of island is planned in order to detect and identify possible features and sites related to the Archaic occupation at Plum Piece. Primary attention will be given to plots of land cultivated in the recent past and indications of land clearing activities, which entailed the introduction of secondary growth vegetation in an otherwise nearly impenetrable rain forest.

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