Preliminary Analyses from the River Site, Barbuda

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Abstract

Lithics collected at an Archaic age site on Barbuda known as "The River" site (BAA004) as part of the 2011 field season of the *Barbuda Historical Ecology Project* (CUNY Brooklyn) is the subject of preliminary analyses presented here. A small collection was analysed during the spring of 2011 at the Prehistoric Lithic Laboratory at Université Laval in Québec, Canada.

Introduction

During January 2011, as part of the *Barbuda Historical Ecology Project* at the *Barbuda Archaeological Research Center* (BARC), a small team was assigned to identify and describe any remaining undisturbed archaeological material associated with the Strombus line, an *Archaic Age* (ca 3,000-5,000 BP) linear shell midden running along much of the southern coast of Barbuda. This feature was described by Watters in the late 1970's (2001). Unfortunately, this geological and archaeological feature has been extensively bulldozed during recent road construction between the River and Spanish Point. In an effort to locate remaining *in situ* archaeological layers, the River site (BAA 004) was identified. This report summarizes the site location and context and describes basic analysis of the lithic artefacts found during the surface survey.

Geography and Geology

Figure 1. Barbuda in the Lesser Antilles

The Antillean island arc formed over a long period of time, as early as 127 MA. Two subsequent volcanic episodes occurred between 127 MA and 85 MA. Specialists think that the volcanic activity of the Lesser Antilles began around 50-45 MA (Meyerhoff and Meyerhoff 1972; Marsh 1979; Sigurdsson *et al.* 1980). There is still volcanic activity in the Lesser Antilles and many of these islands continue to form. The Lesser Antilles is an 800 km island arc (from Saba to Grenada) situated between latitudes 12º to 18º. These small islands have either volcanic or sedimentary origins formed along the eastern margin of the Caribbean plate. Barbuda is one of the Leeward Islands, the northernmost islands of the Lesser Antilles, and is formed exclusively of limestone. This calcareous island is part of an outer arc formed after the uplifting of the earth's crust and marine sediments accumulated on the margins of the plate. This arc includes Barbuda, Antigua and Anguilla (Figure 1). Davis (2000) affirms that the outer arc islands are probably around 10 000 years old. Barbuda could also be the by product of the continental shallow waters of the volcanic island of Antigua or an atoll formation. An atoll is a low island made of a coral reef formed on the shallow flanks of either an underwater mountain or a now eroded island. It can also be a coral reef exposed by a drop in the marine levels.

History

We currently think that the first migrations to Barbuda and the Lesser Antilles occurred between 5000 and 3000 years BC (Rouse 1999, Murphy 1999). We still don't know where these settlers came from. It is currently believed that migrants came from northern South America and/or the Yucatán peninsula and the Greater Antilles at different times. However, further studies are needed to confirm the origins of the first settlers. At the end of the last millennium BC, Saladoid or ceramic-using agriculturalists arrive in the Lesser Antilles (Rouse 1999). According to Davis (2000), several different cultures were present before the Saladoid and Carib peoples encountered by Europeans.

In the northern Lesser Antilles, the marine currents, flowing from S-E to N-W, are relatively slow (Davis 2000, Hofmann 2008). The short distances (and often inter-visibility) between the islands was essential for the cultural development of the populations of the Lesser Antilles. Different resources are scattered amongst the islands and communication and trade are crucial. For example, Barbuda has no local stone suitable for knapping and few terrestrial resources, but does have potable water. On the other hand, Antigua has a lot of high quality lithics but little drinking water. Fortunately, Barbuda is approximately 40km from Antigua and 90km from St. Kitts, two of the most important chert and flint sources of the Lesser Antilles (Knippenberg 2006). According to Hofmann "The discontinuous distribution of subsistence resources and great variability in the availability of raw materials are the driving forces behind the highly mobile nature and diversified procurement strategies of the Archaic Age groups and the establishment and maintenance of the intensive insular contact networks during the Ceramic Age" (Hofmann 2008).

Biodiversity and climate

Barbuda has low biodiversity with little floral and faunal diversity. Reliance on terrestrial food plants and animals was probably low during throughout Barbuda's history, especially before European colonisation which brought many new edible animal and plant species. Mean daily temperature fall between 25° and 28° in St. John's Antigua and is approximately the same in Barbuda. However, precipitation is lower on Barbuda because of its low altitude. Many hurricanes also affect this part of the Lesser Antilles annually.

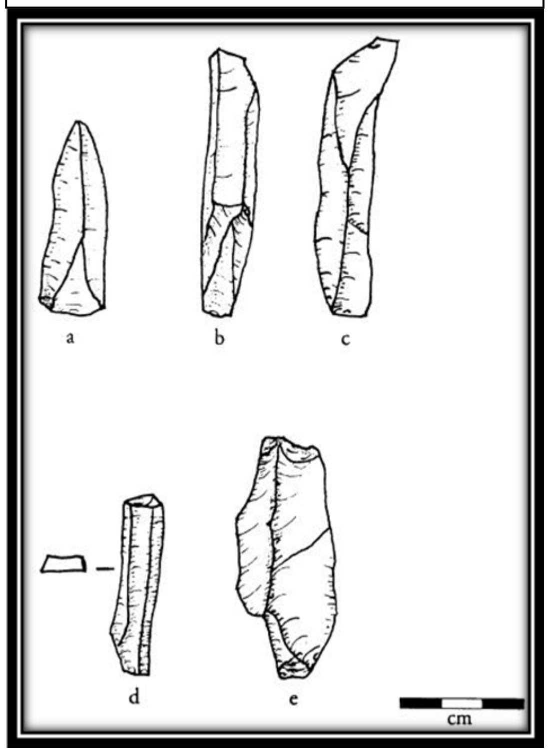
The Archaic Age in the West Indies

The first studies on the Archaic in the West Indies began in the 1970's with Rouse, Davis and Watters working mostly on the islands of Antigua and Barbuda. In 1982, there were 24 known Archaic sites in Antigua, yet only two site have been extensively studied; Jolly Beach (Davis 1982) and North Crabb's Bay (de Mille 2005). Jolly Beach is a shell midden located near the western coast of Antigua. Over 14 800 artefacts were found there, 99% of which were flakes produced from local flint. Since there is so much high quality flint at and near Jolly Beach, Davis was interested in understanding the knapping techniques and tools that were used to produce the blades typical of the Archaic period. He has also studied the settlement patterns and local lithic sources on a local level (relative to concentrations of flint knapping on site) and at a broader level with known chert sources.

According to Davis (1993, 2000) and de Mille (2005), local pre-ceramic technology is focussed around the production of blades with a random core reduction strategy. In fact, the Antiguan Archaic industry is dominated by unretouched flakes and blades. The use of this knapping strategy tells us that the people of the Archaic did not use a sophisticated knapping strategy involving a defined product such as a blade or retouched flakes with specific and distinct functions. When a clearly defined strategy is involved, a flake is produced when a tool is needed or in anticipation of a future need. Given that all lithic sources are exogenous to Barbuda, this low efficiency and the importance of waste material found on Barbuda is quite interesting.

Davis identified five different types of blades, each representing a stage in the core reduction (Figure 2). His typology also points to flakes obtained by direct percussion with either a hard or a soft hammer. There is no evidence for the use of a punch but abrasion is a technique that was possibly used to rejuvenate striking platforms.

Figure 2. The five blade types at Jolly Beach, Antigua (Davis 1993)

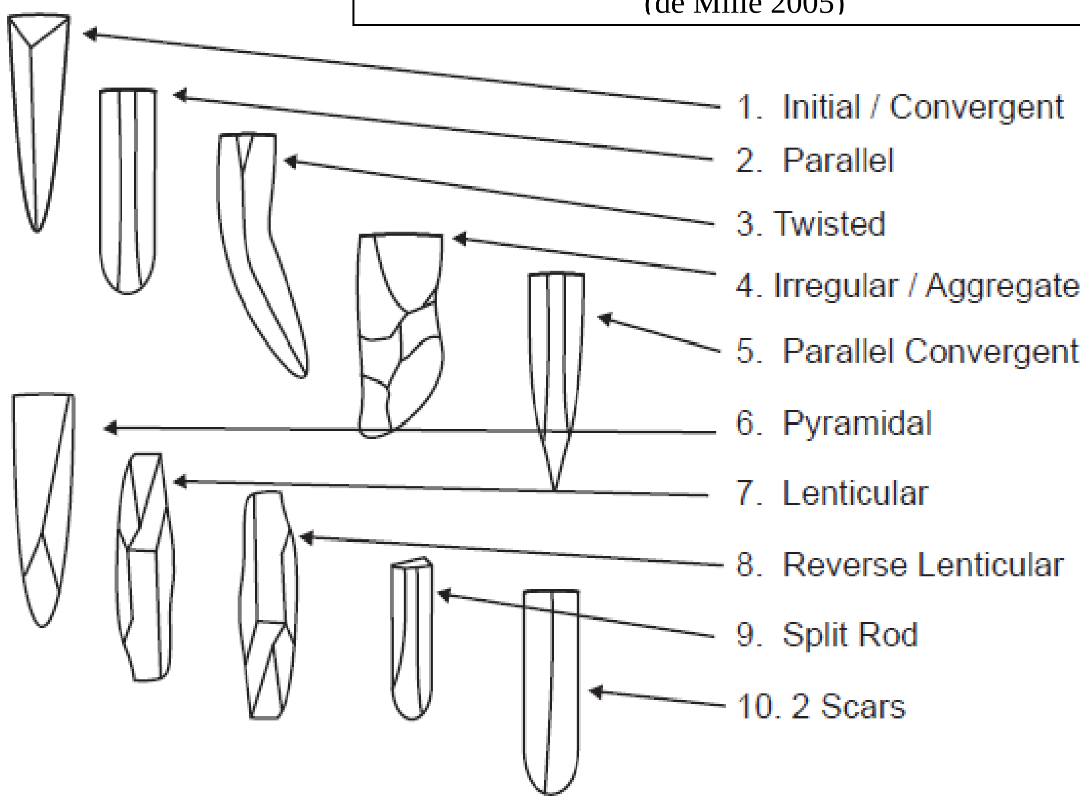


<u>Blades</u>

a= initial blade
b= lenticulate blade
c= pyramidal blade
d= trapezoidal blade
e= aggregate blade.

Both de Mille and Davis identified blade oriented technologies at the Archaic sites they studied. Even if these collections consist mostly of flakes, blades seem to be the ultimate achievement of the Archaic period. Five types of blades are identified by Davis (1993): initial, pyramidal, lenticulate, trapezoidal and aggregate (Figure 2). To these, de Mille (2005) adds 5 new types and changes a name (Figure 3). Her new typology adds the following types: parallel, twisted, parallel convergent, reverse lenticular, and two-scars. Besides, as she points out, de Mille's split rod is the equivalent of Davis's trapezoidal blade (de Mille 2005).

Figure 3. de Mille's blade typology based on Jolly Beach (de Mille 2005)

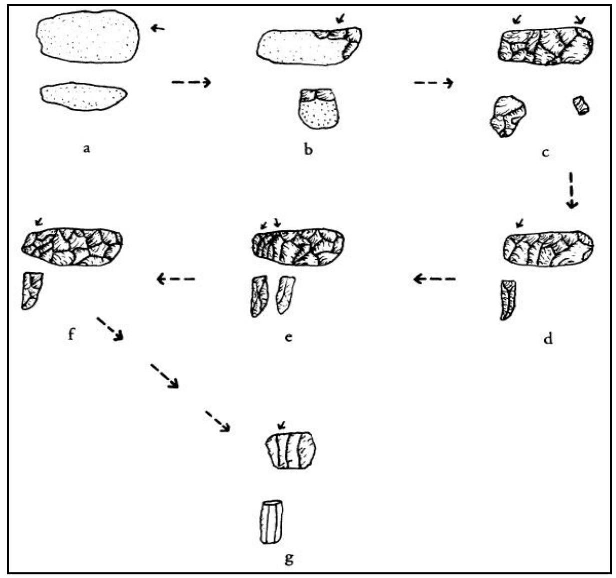


According to Davis (1993), the lenticulate blade was the ultimate achievement of the reduction sequence (Figure 4). He found that these blades showed the largest percentage of edge damage and were the most "straight-sided" of all five types (Davis 1993). These traces may indicate that the lenticulate blade was the most commonly used type of flake among the prehistoric people of Antigua. However, further analysis is necessary to understand precisely what the main uses of these flakes or blades were. Use wear analysis could provide this information and confirm whether use is anthropic or natural. Also, the thicker aggregate blades would have been produced near the end of the usable life of a core, when trimming is moderated by the risk of an irreparable break to the core. Trapezoidal blades would be the result of a mistake in the last steps of knapping, resulting in splitting core blades in half (Davis 1993). According to de Mille (2005), the low volume of blades recovered at North Crabb's Bay suggest they might have been exported or discarded elsewhere on the site.

Flakes

The generalised reduction of cores for the production of usable flakes is rarely studied (de Mille 2005). The kind of reduction sequence found on these sites is also referred to as an "amorphous", "generalised" or "expedient" core technology. Even if this technology is oriented toward blades, it produces many flakes as by-products. These flakes may vary according to the original core shape and the knapper's ability. They can be small platform preparation flakes or large reduction flakes. To illustrate the small ratio of blades to flakes, the statistics from both studies (Jolly Beach and North Crabb's Bay) are useful. At North Crabb's Bay, only 2.6% of the lithic products are blades (N=1213) while the blades of Jolly Beach varies between 0.1% and 3% of the total assemblages of each feature. However, according to Davis (1993), even if the blades represent only a small proportion of the lithic artefacts recovered their *chaîne opératoire* accounts for at least 90% of the products involved. Still according to Davis (2000), 50% of the flakes recovered at Jolly Beach are angular waste.

Figure 4. Blade reduction sequence at Jolly Beach (Source: Davis 1993; Davis, 2000)



Angular waste is a by-product of knapping. It consists of angular flakes on which the usual stigmas produced by the knapping activity (bulb, stricking platform and the several other scars useful to the analyst) are barely visible or even absent. We usually see great concentrations and percentages of angular waste when the debitage strategies are expedient, as it seems to be the case in Barbuda. The high percentage of angular waste found in Antigua is attributed to the reduction processes of blade production at well-established times in the reduction sequence. The biggest problem with flakes is to understand if they were produced as a tool or are only a by-product of a more complex industry (i.e. characterized and standardized blades or flakes). It is therefore hard to confirm the place of each artefact in the different steps of core reduction and tool production. It gets even more complicated when you have both expedient technology and blade production at the same time.

Cores

The cores found on the Archaic sites of Antigua are generally smaller than 6 cm. Both Davis and de Mille identified two major types of cores: blade cores and flake cores. Blade cores are generally smaller and cylindrical (Davis 1982, 1993). It is also rarer than the irregular flake core which yields many irregular flake scars. Cores found at Jolly Beach are all nodular (Davis 1982). It seems that bedded cherts, that need to be extracted, were not used. The Archaic people appeared to prefer the outcropping nodules washed up on the shores versus the linear extractible chert formations. It is often possible, from the shape of the core, to identify the specific, intended step of the blade reduction process. It is also possible that a flake core either becomes a blade core, if suitable for blade production, or is discarded (Davis 1993). De Mille's core study (2005) suggests that 25% of cores are typical of unidirectional reduction, 10% of bidirectional reduction and 18% of multi-directional reduction. A remaining 47% are unidentified. This hints at the techniques used by the Caribbean Archaic people.

Hammerstones

Hard hammers might have been simply chert cobbles (de Mille 2005) while soft hammers many have been made from several primary materials. According to many authors, these were probably manatee bone, hard wood, shells or limestone.

The River Site, Barbuda (BAA004)

Identifying Archaic sites on Barbuda is challenging as these sites are normally established near faunal resources or lithic sources (de Mille 2005) both of which are absent in Barbuda. However, the Strombus line is a well-known feature, recorded in the 1970's by David Watters (2001). However, very few studies have documented this unusual phenomenon. According to Watters (2001), this feature is a 3km long paleoshoreline dividing two geological complexes of the south-western coast of Barbuda. This long lithified ridge is characterised by an accumulation of shells (mostly *Strombus gigas*) and lithic artefacts. Archaeologists and geologists agree that the Strombus line separates past and recent geological formations (Palmetto point is a recent geomorphological product) and that there was an early human presence because of the tools found. However, experts disagree about the important accumulation of the *Strombus*

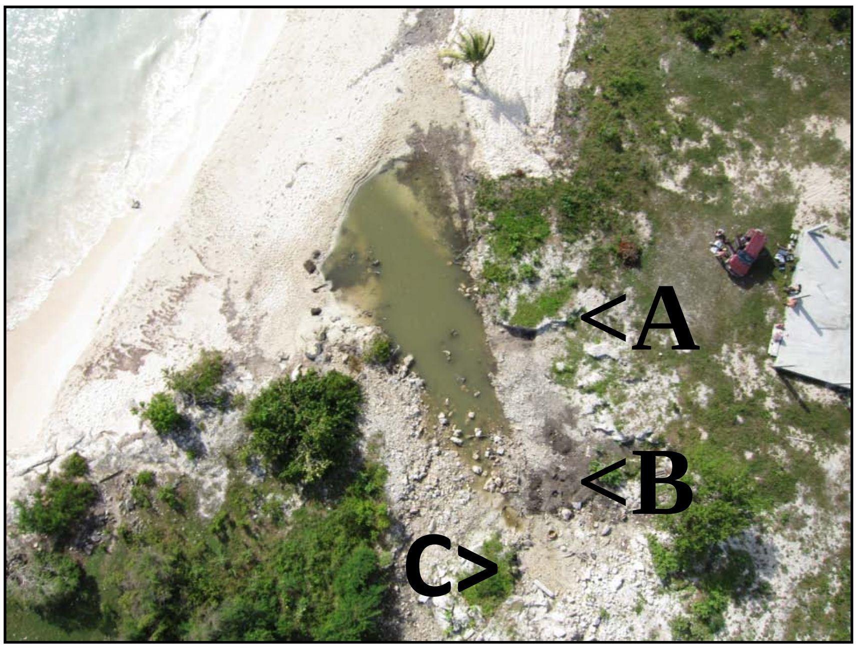
Figure 5. The River Site

gigas shells. While Watters believes they accumulated naturally, Donahue thinks they are the by-product of anthropic activity (Watters 2001).

The Strombus line has C14 dates of 3825 ±25 BP - 2530 ±70 BP (Watters 2001). According to McGovern (2011), "these extensive Archaic Age deposits clearly represent a major archaeological and heritage resource for future investigation". Recent dates from the 2011 field season (3280 ±35 BP and 2790 ±35 BP), support the original dates.

The River archaeological site, located near the modern dock and the sand processing plant, was targeted for study as it was endangered by both human and natural processes. It also is in the middle of the Strombus line archaic feature (Figure 5). BAA 004 consists of small sections of a surviving *in situ* shell midden that was eroded by the sporadic and seasonal flow of "the River". "The partially buried shell deposit extends diagonally inland (NW), away from the modern shoreline and seems to run beneath the modern sand processing plant before emerging as a positive linear mounded feature on the western side of the sand plant" (McGovern *et al.* 2011). Trying to save what was left of the site and gather as much information as possible, "the team carried out a small scale rescue excavation at two localities (Area A and B) and cut a small profile nearby (Area C)" (Figure 6, McGovern et al. 2011). Area C was a trench dug to examine the site's stratigraphy for the purposes of interpreting the numerous contexts of the site. Both Areas A and B yielded only lithic artefacts and a lot of shells. Both areas showed different natural layers representing either windblown sand, mangrove soil deposits or alluvial sand. Moreover, both areas contain a cultural layer consisting of dark brown organic silt with many shells, fire cracked rocks, charcoal and lithics (McGovern et al. 2011).

Figure 6. Areas excavated at The River Site



Summary of the surface collection from the River

Medium grained chert has been noted on Barbuda and on the site, but no evidence of its use by early peoples has been proven. Although, these stones might have been used as hammerstones, again there is no proof. Indeed, all the knapped stones found at the River seem to be exogenous according to Knippenberg's study (2006), which is useful for the location of possible lithic sources based on color, fineness of grain or particular features.

It is difficult to compare the River Site with known sites in Antigua because of the small size of study material from 2011. It is, however, possible to draw inferences about reduction strategies, knapping tools and techniques used, and to characterize the lithic assemblage. Given that all lithic artefacts are exogenous, the amount of flakes found during the surface collection is impressive (figure 7). Paradoxically, the inhabitants of the River Site used expedient knapping to produce stone tools. The varying shape of the flakes seems to suggest an unpremeditated or *ad hoc* reduction strategy.

Figure 7. Flags showing lithic locations

Given that the majority of bulbs identified on the flakes are either small or extended but not protruding and that the impact points are rarely visible, this collection might therefore be representative of direct percussion with a soft hammer. However no firm conclusions can be drawn about this yet. Cross-referencing with other collections, or experimental archaeology would be necessary to confirm this. As mentioned in de Mille's thesis (2005), hard hammers such as chert cobbles might also been used. On this site as on the Archaic sites studied on Antigua, the use of indirect percussion with a punch cannot be proven (Davis 2000; de Mille 2005). This suggests a rather primitive knapping technology in use on Barbuda at this time.

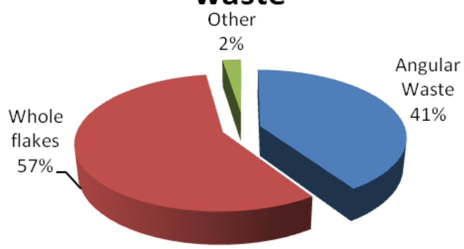
The surface collection includes 111 lithic finds, several of which were excluded from this analysis as it is not yet certain that they are artefacts. Ninety-one lithic artefacts, that appear to be exogenous to Barbuda were analysed. Most of the collection is fine grained. In fact, only one artefact has a medium grain size while 81 are fine grained and 9 are fine to very fine grained.

Within this group of detached flakes (N=81), only 4 can theoretically be considered as blades but in no way can it be called a blade industry. They are probably elongated flakes that happen to fit the description of a blade. For this reason, the lithic industry at the River can't be associated with the Archaic complexes of Antigua. However many flakes appear to be initial blades but are a little too wide to be considered as such.

Ten artefacts are classified as cores; however, it is again possible that some of these are only large flakes. However, many of them yielded flake scars without showing the usual scars of the ventral surface (this mean they can't be considered as flakes but would have been classified as angular waste). They also are bigger than the rest of the flakes; their mean maximal length is 34.2mm. These may actually be blade cores as they yield blade scars, one of which was a 31mm x 10mm blade, typical in size with other Archaic complex blades. Three of the ten cores have cortex material suggesting a thorough use of cores.

The flakes from the River site contain information crucial to our understanding of the knapping technologies of past Barbudians. Like the cores, they are generally small (mean maximum length is 25.1mm N=81). Fortunately, 46 of these (57%) are whole flakes and will therefore be useful for future analyses. However, the rest of the collection or 41% is angular waste that provides little technological information. (Figure 8)

Figure 8: BAA-004 Surface collection
Whole flakes to angular waste



Almost half of the flakes (48%) had visible patina, while 18 specimens (22%) were burnt and shows pot lids and signs of high heat in the form of colour changes or angular fractures.

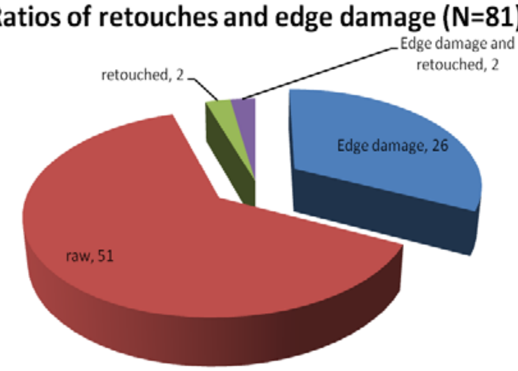
Furthermore, many flakes are cortical as they still have the thick calcareous crust that formed around the cobble. Most of the cortex is characteristic of secondary origin (river or shore pebbles) and is often patinated. Cortex was still visible on 56 (70%) of the surface collection flakes from the River.

Understanding the provenience of artefacts can be a difficult task for archaeologists, especially when there is not an exhaustive list of potential lithic sources. Archaeologists working near the chert source of Long Island often have generalized (and perhaps over generalised) the lithic provenience of their artefacts to this island. Knippenberg's thesis (2006) is the first step towards correcting this for the Leeward Islands. This small study from the River site is a good example of the diversity of proveniences that may be found on a single site. For example, 46 flakes (57%) show white veins or clouds typical of Long Island chert but only 28 of them (61%) have the typical grey to dark grey matrix. The variety of colours (17 different colours) also suggests diverse proveniences.

<u>Potential tools</u>

Of the 81 flakes and blades, only 4 (5%) have possibly been retouched. However, as pointed out by Davis and de Mille, Archaic people seem to have often used unretouched materials. Amongst these, twenty-eight flakes (35%) show edge damage, however, use wear analyses are needed to confirm the use of these flakes.

Figure 9: BAA-004 Surface collection
Ratios of retouches and edge damage (N=81)



Seven flakes from the 2011 season

Seven of the most interesting surface collection flakes are described in this section. Flakes S-8, S-37, S-38, S-40, S-61, S-96 and S-101 will be discussed in detail. It should be noted that these are preliminary macroscopic observations.

BAA-004S-8

Made of cherty-limestone, the main characteristic of S-8 is a groove or channel. It looks like a typical grinding stone and may have been used to sharpen the edge of a shell to form a shell adze. Further studies are required to understand its functions and its use. Its maximum length is 27mm.

Figure 10. BAA-004S-8

BAA-004S-37

Artefact S-37 is a typical example of dark grey Long Island chert. It has a fine to very fine grain and its white veins corroborate with Knippenberg's study (2006). This long flake show signs of retouches and it appears to have two bulbs, one on each side of the flake. It is suggested that this is representative of bipolar reduction; however it should have a negative of a bulb. The retouches on its left side are very interesting because they are well defined and quite regular. Its maximum length is 37mm.

Figure 11. BAA-004S37, ventral surface

BAA-004S-38

This fine to medium grained flint flake is blond to pale brown. Since this color is rarely found in Barbuda, the possible provenience is very interesting. According to Knippenberg (2006), this color of chert might come from any one of a number of secondary occurrences of Antigua, or from Cerillos, Las Palmas or Moca in Puerto Rico or from St. Kitts. It is unlikely that it comes from Long Island, Little Cove or Soldiers Point in Antigua.

Wear patterns are observed on part of the striking platform (darker brown). It is also possible that this piece has been used as a notch since the middle of the notch shows wear. The dorsal surface shows scars of blade or flake

Figure 12. BAA-004S-38, ventral surface

removal (reversed bulb, impact point). Its maximum length is 28mm.

BAA-004S-40

Figure 13. BAA-004S-40, edge on ventral surface

S-40 is an example of very fine grained chert from Long Island, Antigua (according to Knippenberg's 2006 description). Long Island flint is characterized by white clouds (or veins) in a dark grey matrix. Its maximum length is 37mm. The right side is retouched along the entire length, mostly on the dorsal surface. This flake is from a second phase of debitage and has lots of visible of cortex. With clear traces of retouching, S-40 is one of the best preserved artefacts of the River surface collection.

BAA-004S-61

Figure 14. BAA-004S61 Dorsal surface, note the heterogeneous matrix

This heterogeneous beige to grey chert has many white veins and darker inclusions. This artefact has a huge bulb with an incipient cone. The impact point is also fissurated. These are signs of direct percussion. It also bears a scar that looks like a step fracture, but this remains certain. Artefact S-61 has a long edge with numerous signs of wear. Its maximum length is 34mm.

Depending on the color and the many inclusions of fossils, this may come from either Coconut Hall, part of the secondary formation of Antigua or Corbison Point in the central plains of Antigua (Knippenberg 2006). It is therefore possible to suggest that these parts of Antigua were also used for the lithic exploitation and exportation.

BAA-004S-96

Figure 15: BAA-004S-96, edge

According to Knippenberg's description (2006), S-96 is an example of very fine grained Long Island chert. This example has characteristic white clouds (or veins)

in the dark grey matrix. Its maximum length is 21mm.

This artefact has a shattered striking platform appearing on the dorsal surface and probably a knapping scar. It does not have a prominent bulb, and may have been knapped with a soft hammer using direct percussion. It also bears retouches on the right side of the dorsal surface.

Figure 16: BAA-004S-101, edge on dorsal

BAA-004S-101

Of a variable colour (light grey to dark grey with hints of olive), this artefact may have been heat treated. Most of the proximal part was removed by retouching. It is possible to see a fraction of what may have been a prominent bulb. However, retouches on the right side of the artefact form a pointed tip and an edge that will be examined in the future.

Conclusions

The blade industry observed on Antigua is the only well documented Archaic industry near Barbuda. Although, even if Archaic peoples living at the Strombus line used the same materials (Long Island chert and other exogenous cherts), we cannot say that the River lithic industry, which does not have a blade industry, is comparable to the Jolly Beach complex. However, the small size of this initial study collection precludes any strong conclusions at his point. A more complex and complete collection will be necessary for further study. However, it must be pointed out that whole flakes dominate the collection. Since a blade industry produces more angular wastes than whole flakes, we might be in the presence, on Barbuda, of a flake industry. Therefore, if the River's lithic production was oriented toward blade production, the vast majority of blades were discarded or used elsewhere. It is then plausible that flake production was the goal of this expedient tool production technology. Future research employing use-wear analyses on flakes or on the retouched or edge-damaged artefacts may reveal the function of these tools.

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Bibliography

Davis, D. D., 2000, *Jolly Beach and the Preceramic occupation of Antigua, West Indies*, Yale University Publications in Anthropology, 84, New Haven, 147p.

Hofmann, C.L. 2008. The Lesser Antilles. pp.143-153. in Pearsall, D. 2007. *Encyclopedia of archaeology*. University of Missouri.

Knippenberg S. 2006. *Stone artefact production and exchange among the Northern Lesser Antilles*. PhD thesis, Leiden University, Leiden, Netherlands.

Marsh, B.D., 1979. Island arc development : Some observations, experiments, and speculations. *The Journal of Geology*, 87 (6): 687-713.

McGovern, Thomas, Adolf Friðriksson, Garðar Gudmundsson, Frank Feeley, Vincent Rousseau, Orri Vésteinsson and Jessica Vobornick, *Investigations at the RIVER Site (BAA 004) Field Report January 2011*, Barbuda Archaeological Research Center, 2011, 17p.

Meyerhoff, A.A. and Meyerhoff, H.A., 1972. « Continental drift, IV : The Caribbean "plate" ». *The Journal of Geology*, 80 (1): 34-60.

de Mille, C.N. 2005. *A tale of chert with a side of shell : The Preceramic Occupation of Antigua, West Indies*, unpublished Phd thesis, University of Calgary, Calgary, Canada.

Murphy, A. R. 1996. *The Archaeology of Muddy Bay, Antigua: A Post Saladoid Settlement*. Master's thesis, Department of Anthropology, Trent University, Peterborough, Ontario, Canada.

Murphy, A. R. 1999. *The Prehistory of Antigua, Ceramic Age: Subsistance, Settlement, Culture and Adaptation Within an Insular Environment*, unpublished Phd thesis, University of Calgary, Calgary, Canada.

Murphy, A. R., 2002. *The Late Ceramic Age, Antigua: Cultural Development and Adaptation within an Insular Environment*. Chapter presented at the University of Leiden, Holland, 15 april, and at the University of Paris, 21 april, 2002. In press.

Sigurdsson, H., Sparks, R.S.J., Carey, S.N. and Huang, T.C., 1980. Volcanogenic Sedimentation in the Lesser Antilles Arc. *The Journal of Geology*, 88(5) : 523-540.

Watters, D. R., 2001. *Preliminary report on the correlation of archaic-age localities with a paleoshoreline on Barbuda* in Proceedings of the XIX International Congress for Caribbean Archaeology, pp.102-109.