

NEW RADIOCARBON DATES FOR THE GRENADINE ISLANDS (WEST INDIES)

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ABSTRACT. Intensified archaeological research in the Caribbean over the past 2 decades has provided a wealth of new information on how and when these islands were settled prehistorically. However, there has been a paucity of research on islands in the southern Lesser Antilles, which would allow for more rigorous testing of migration models and various settlement pattern hypotheses. To address some of these chronological and geographical gaps, we present a corpus of 41 radiocarbon dates from several sites in the Grenadine Island chain. Results to date support a relatively late Ceramic Age settlement of these smaller islands (about AD 400) compared to other nearby, larger islands in the southern Lesser Antilles (about AD 200) as well as the Caribbean as a whole (about 400/500 BC). Intriguing questions also remain as to an apparent, but as yet inadequately tested, pattern where earlier colonization dates are correlated with larger island size.

INTRODUCTION

Over the last few decades, archaeological research in the Caribbean has steadily intensified, generating a tremendous amount of new data. This includes increased attention by archaeologists to radiocarbon dating that has helped refine chronologies of human colonization, settlement, and subsequent cultural changes that occurred over time. Critical appraisal of whether all dates meet analytic standards for use in the construction of chronologies has generally been lacking in the region though (see Fitzpatrick 2006). Many recent papers have illustrated why this issue is important, with closer scrutiny of dates leading to, for example, new insights about the distribution of prehistoric settlements (Cooper 2010) and how artifact typologies in the Caribbean are structured (Rodríguez Ramos 2010).

A major geographical gap in the investigation of Pre-Columbian societies in the Caribbean, and henceforth the development of ^{14}C chronologies that would help contextualize settlement patterns in the region, is in the southern Lesser Antilles south of Guadeloupe where research has been generally sparse and virtually nonexistent on some islands since the 1960s (Bullen and Bullen 1972). Although research initiatives on the larger islands of Barbados (Drewett 1991, 2000), St. Lucia (Hofman and Hoogland 2009), and St. Vincent (Callaghan 2007), for example, have provided new clues as to when this part of the Caribbean was settled, the Grenadines in particular remain somewhat of an enigma. As a testament to the deficiency in research, until 2004 only 3 sites had been excavated (albeit sparsely) and only 4 ^{14}C dates from archaeological sites existed for all of the Grenadines despite over 50 sites having been identified (see Bullen and Bullen 1972).

To address this issue, we present a list of all known ^{14}C dates from archaeological contexts in the Grenadines. Of the 41 dates now available, 37 are new and derive from research led by Fitzpatrick and colleagues, with 15 of those previously unreported. The compilation of this extensive suite of dates provides an important framework for investigating a host of important issues in Caribbean archaeology, ranging from colonization events, migration strategies, and settlement patterns within and between islands in the southern Lesser Antilles, as well as questions related to apparent site and/or island abandonment prior to European contact in the late 1400s.

RESEARCH BACKGROUND

The Grenadines are a chain of 6 major islands—Bequia, Mustique, Mayreau, Canouan, Union, and Carriacou, and numerous smaller ones with a total land mass of 80 km²—that stretch for 60 km

on several islands in the southern Caribbean, including Carriacou, Mustique, and Barbados (Drewett 2007:49–63).

Soil quality is relatively low and terrestrial environments lack large, endemic, nonvolant animals, particularly mammals, which are represented on the islands prehistorically by only bats and possibly rice rats (*Oryzomyini*). Perhaps for these reasons the archaeological record for the region indicates the introduction of several South American taxa, including the agouti (*Dasyprocta* sp.), the opossum (*Dideplphis* sp.), and possibly the green iguana (*Iguana iguana*) for dietary consumption (Newsom and Wing 2004; Stahl 2009; Giovas et al., forthcoming). The zooarchaeological record also suggests heavy exploitation of marine resources, particularly finfish and gastropod mollusks (LeFebvre 2007; Fitzpatrick et al. 2009; Giovas 2009). In contrast to the larger islands that bound them to the north and south, the Grenadines have relatively extensive reef development with large bank barrier reef complexes on the windward side of some islands, especially off the eastern coasts of Petit Martinique, Carriacou, and the Tobago Cays (Tupper et al., <http://www.reefbase.org>).

Archaeologically, the Grenadines have received little attention until recently. Although Jesse Fewkes (1914) ventured through the islands collecting representative samples of artifacts for the Smithsonian Institution—supplemented later with more extensive surveys by I A Earle Kirby (1969) through the St. Vincent Archaeological and Historical Society—Ripley and Adelaide Bullen (1972) were the first to initiate a more concerted research program to record Pre-Columbian settlements in the region. Through these efforts, a number of important sites were reported in the Grenadines, though only Sabazan on Carriacou and Chatham Bay on Union were excavated to any degree, which was later supplemented by Suttly's (1975) work at Miss Pierre on Union. This early research indicated a comparatively late occupation of these islands during the Ceramic Age, which throughout the Antilles spans a period of about 500 BC–AD 1400. Bullen and Bullen's temporal assignment of sites was based largely on ceramic typologies. However, they did obtain a single ¹⁴C date from the excavation of a foot-thick “slice” of Sabazan's coastal profile (940 ± 100 BP) as well as 1 ¹⁴C date at Chatham Bay (1470 ± 110 BP) that in general confirmed their estimates (Bullen and Bullen 1972: 14–7) (see Table 1).

In 2003, Fitzpatrick and colleagues Quetta Kaye and Michiel Kappers initiated a research project on Carriacou, the largest and southernmost island in the Grenadines. Intensive survey found or re-recorded at least a dozen sites (Fitzpatrick et al. 2006, 2009) with artifactual assemblages that were typical of Ceramic Age deposits. Later excavation at the 2 largest of these sites—Grand Bay by Fitzpatrick and colleagues and Sabazan by Giovas as part of her PhD research—over several field seasons (2004–5, 2007–8, 2011), demonstrate that both sites contain a wide array of archaeological remains and features indicative of long-term habitation that span the terminal part of the Saladoid period (about AD 1–500/600) on through the Troumassan Troumassoid (about AD 600–1000) and Suazan Troumassoid (about AD 1000–1400) subseries of ceramic styles (see Fitzpatrick et al. 2004, 2009; also Petersen et al. 2004 for description of ceramic typologies). In addition to Carriacou, research has also begun to expand to other islands in the north (Fitzpatrick et al. 2007) and includes preliminary subsurface testing by Fitzpatrick and Kappers in May 2010 at 2 Chatham Bay sites (a northern and southern one, referred to by Bullen and Bullen [1972] as “Chatham Midden” and “Chatham Pasture,” respectively) and Miss Pierre on Union Island, a previously unrecorded site on Mustique known as Lagoon Bay, and ¹⁴C dating of the eroded coastal profile at Banana Bay on Baliceaux. New archaeological data from these sites, along with those on Carriacou, have supplemented earlier work and built a strong foundation for continuing more intensive investigations of the Grenadines in the near future. More importantly, it has allowed us to develop a better chronology of human settlement in this smaller island chain as we discuss below.

Table 1 Radiocarbon dates from the Grenadine Islands (calibrated with CALIB 6.0.1 using the IntCal09 and Marine09 calibration curves). Human bone calibrated as 50% marine/50% terrestrial to reflect a mixed diet.

Site	Lab nr	Type	Species	Unit	Layer	Depth (cmbs)	¹³ C/ ¹² C ratio	Measured ¹⁴ C age	cal AD (2 σ)
Carriacou									
Grand Bay	AA-62278	shell	<i>C. pica</i>	447	XV	145	2.53	1917 ± 37	390–590
Grand Bay	AA-62279	charcoal	—	447	VI	110	-25.13	1243 ± 36	680–880
Grand Bay	AA-62280	shell	<i>Venus</i> sp.	447	VI	127	3.39	1789 ± 38	530–690
Grand Bay	AA-62280	shell	<i>Venus</i> sp.	447	VI	127	3.36	1822 ± 41	470–670
Grand Bay	AA-62281	charcoal	—	447	VI	93	-23.96	1339 ± 36	640–770
Grand Bay	AA-62282	charcoal	—	F016	—	—	-25.97	1227 ± 36	690–890
Grand Bay	AA-62283	bone	human (child-rt. fibula)	F006	—	—	-14.21	1062 ± 44	1050–1250
Grand Bay	Beta-206685	shell	<i>E. gigas</i> (juvenile)	N. profile	—	108	2.1	1870 ± 70	380–670
Grand Bay	Beta-233647	shell	<i>C. pica</i>	415	V	—	1.8	870 ± 40	1020–1200
Harvey Vale	AA-62284	bone	human (rt. ulna)	—	—	—	-12.55	1027 ± 46	1060–1280
Sabazan	RL-29	charcoal	—	midden	—	~60–80	—	940 ± 100	900–1270
Sabazan	GX-30423	shell	<i>C. pica</i>	profile	VI	160	2.4	1400 ± 60	870–1160
Sabazan	GX-30424	shell	<i>E. gigas</i>	profile	X	200	0.2	1570 ± 60	690–970
Sabazan	GX-30425	shell	<i>C. pica</i>	profile	XI	230	2.5	1460 ± 60	790–1060
Sabazan	OS-41358	charcoal	—	profile	X	215	-23.94	1030 ± 30	900–1120
Sabazan	AA-67529	charcoal	—	profile	XI	53–108	-25.6	988 ± 42	980–1160
Sabazan	AA-67530	charcoal	—	profile	XI	53–108	-25.6	1039 ± 35	900–1120
Sabazan	AA-67531	charcoal	—	profile	XIII	108–115	-24.6	1133 ± 38	780–990
Sabazan	AA-67532	charcoal	—	profile	XIII	108–115	(-25)	1073 ± 38	890–1020
Sabazan	AA-67533	charcoal	—	profile	XIV	115–154	(-25)	1172 ± 36	770–970
Sabazan	AA-67534	charcoal	—	profile	XIV	115–154	-24.6	1333 ± 57	600–860
Sabazan	AA-67535	charcoal	—	profile	XV	149–164	-24.8	1588 ± 36	400–550
Sabazan	AA-67536	charcoal	—	profile	XV	149–164	-25.8	1584 ± 36	410–560
Sabazan	AA-81054	charcoal	—	Tr 1: sq 1	2	3–13	-23.8	657 ± 44	1280–1400
Sabazan	OS-71407	charred seed	—	Tr 1: sq 1	4	30–34	-23.55	960 ± 15	1020–1150
Sabazan	OS-71408	charcoal	—	Tr 1: sq 1	5	43–53	-25.99	970 ± 15	1020–1150
Sabazan	AA-81056	charred seed	—	Tr 1: sq 1	6	57–67	-25.5	994 ± 45	910–1160
Sabazan	OS-71409	charcoal	—	Tr 1: sq 1	6	73.5	-24.73	925 ± 15	1040–1160
Sabazan	OS-71410	charcoal	—	Tr 2: sq 1	2	2–11	-26.05	> modern	modern
Sabazan	OS-71462	charred seed	—	Tr 2: sq 1	3	19–29	-24.5	975 ± 20	1020–1150
Sabazan	AA-81055	charcoal	—	Tr 2: sq 1	3A	40–50	-25.1	1158 ± 45	730–990
Sabazan	OS-71463	charcoal	—	Tr 2: sq 1	3A	75.5	-23.62	1140 ± 15	870–970
Sabazan	OS-71464	charred seed	—	Tr 2: sq 1	8	89–91	-24.03	1100 ± 20	890–990
Sabazan	OS-71465	charcoal	—	Tr 2: sq 1	9	115	-24.04	1080 ± 15	900–1010
Sabazan	OS-71466	charcoal	—	Tr 3: sq 1	2	8–19	-24.77	680 ± 15	1280–1380
Sabazan	OS-71467	charcoal	—	Tr 3: sq 1	3A	84	-25.67	1220 ± 20	710–880
Mustique									
Lagoon Bay	Beta-286849	shell	<i>E. gigas</i> (juvenile)	2	3	70–80	0.5	1370 ± 50	910–1160
Baliceaux									
Banana Bay	Beta-286848	shell	<i>C. pica</i>	S. profile	—	30	2.8	970 ± 50	1310–1460
Banana Bay	RL-71	shell	<i>E. gigas</i>	—	—	—	—	530 ± 110	1580–1950
Banana Bay	RL-27	shell	<i>E. gigas</i>	10 ft in from midden face	—	—	—	720 ± 100	1430–1820
Union									
Chatham Bay	RL-70	shell	<i>E. gigas</i>	—	—	—	—	1470 ± 110	710–1140

RESULTS

The 41 ¹⁴C dates compiled thus far come from 6 sites (Grand Bay, Harvey Vale, Sabazan, Lagoon Bay, Banana Bay, and Chatham Bay) on 4 different islands (Carriacou, Mustique, Baliceaux, and Union) (see Table 1). The majority of the dates are from Carriacou (*n* = 36; 88%), with 26 (63%) of those coming from the Sabazan site; the remainder (*n* = 5) are from the other 3 islands. Thirteen of the samples are from marine shell, 22 from charcoal, 3 from charred seeds, and 2 from human bone.

All samples were calibrated using CALIB 6.0.1 (www.calib.org) that incorporated the IntCal09 and Marine09 calibration curves (Reimer et al. 2009; see Figure 2 below). Few attempts have been made to determine local marine reservoir effects in the Caribbean. Studies in the Cariaco Basin, Venezuela (Hughen et al. 1996), Jamaica, the Bahamas (Broecker and Olson 1961), and Puerto Rico (Kilbourne et al. 2007) suggest, however, that the ΔR may be minimal. The regional average for the Caribbean, including the Florida Keys and locations along the northern South American coast, is now estimated to have a weighted mean ΔR of 15 ± 40, although this may change as further studies are conducted (also see www.qub.ac.uk/arcpal/marine). Given the dearth of ΔR offsets in the Antilles, none of which are local to the Lesser Antilles, we chose not to include them into the calibrations. However, given that the ΔR can be significant in many areas of the world and have the potential to alter existing chronologies that rely heavily on marine shell (see Bayliss et al. 2004; Ascough et al. 2005a,b), it is critical that further studies be conducted on this issue.

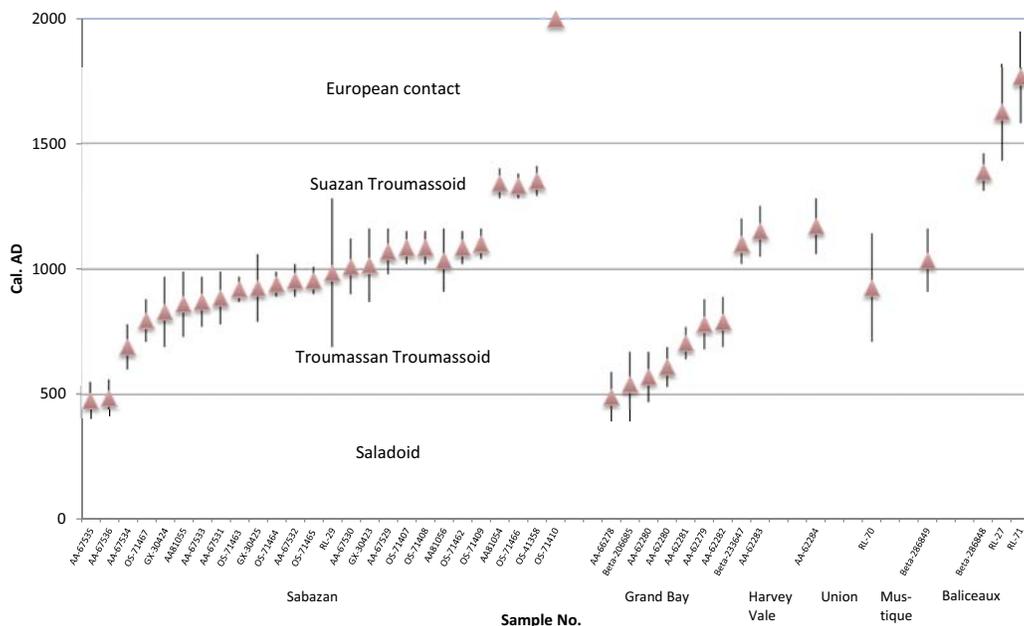


Figure 2 Graph showing range of all calibrated dates (2 σ) for sites on Carriacou (Sabazan, Grand Bay, Harvey Vale) and other Grenadine Islands (Union, Mustique, and Baliceaux).

Overall, the earliest date from any of the Grenadine islands comes from the Grand Bay site on Carriacou, which has 2 assays dating back to as early as AD 380/390 (AA-62278, Beta-206685) at 2 σ. That these samples were taken from the lowest portion of cultural layers exposed along the 120-m-long coastal profile at both the northern and southern ends suggests this represents the earliest settlement of the site, which occurred during the terminal Saladoid period. While extensive erosion has

impacted the integrity of the site leading to the annual average loss of 1 m of coastline per year since at least 1999 (Fitzpatrick et al. 2006), Bullen and Bullen's (1972:13) observation over 40 yr ago that the site was "not occupied during the earlier [i.e. 500/400 BC–AD 1] Saladoid periods" based on pottery types seems to confirm this assessment despite significant loss of anthropogenic deposits. Two other nearly coeval dates from Sabazan dating back to AD 400 (AA-67535, AA-67536) at 2 σ , also from the lowest cultural layer in the coastal profile, indicate that the 2 sites were occupied contemporaneously. Additional dates from 3 excavated trenches at Sabazan located 40–50 m inland from the coast are slightly later in time (about AD 700–800 to 1400), though sterile soil has not yet been reached for 2 of the 3 units. The basal date for the completed unit is AD 1040–1160 (OS-71409) at 2 σ . The dates from Grand Bay and Sabazan suggest continuous, long-term occupation of these sites for nearly a millennium.

The earliest available ^{14}C dates from the sites of Banana Bay (Baliceaux) (AD 1310–1460 at 2 σ [Beta-286848]), Lagoon Bay (Mustique) (AD 910–1160 at 2 σ [Beta-286849]), and Chatham Bay (Union) (AD 710–1140 at 2 σ [RL-70]), though few in number, may not be necessarily representative of the earliest occupation of each site, but are nonetheless consistent with an occupation of the Grenadines that took place post-AD 400, which seems to have begun, or intensified, around AD 700. Two additional dates for Baliceaux (RL-27 and RL-71) span a temporal range overlapping or postdating European contact. Three of the 5 dates available for these islands were collected during Bullen and Bullen's (1972) survey through the area, and all but 1 postdating AD 1580 (RL-71) fall within the date ranges of the more recently obtained dates we report here. It should be noted that given the general paucity of good ^{14}C chronologies for most major sites in the Grenadines apart from those on Carriacou, it is difficult to say whether Bullen's dates accurately reflect the sites' true ages (earliest or not). As demonstrated by Fitzpatrick (2006) using a chronometric hygiene approach, sites with only a single date should be viewed cautiously until additional dates are provided to support either local or regional chronologies. The possibility also exists that some dated samples derive from older specimens that can lead to the "old wood" or "old shell" problem (e.g. Rick et al. 2005). In the case of our dates, juveniles of particular marine taxa (usually *Strombus* (*Eustrombus*) *gigas*¹ and *Cittarium pica*) in association with terrestrial samples (charcoal or seeds) are typically used for dating to avoid problems with long-lived species and gauge whether there are noticeable differences between or within strata. But, the issue remains that very few sites in the Caribbean have well-established ^{14}C chronologies and single dates of stratigraphic contexts and sites remains problematic. Suffice to say, the dates from Mustique, Baliceaux, and Union all fall within the expected range of settlement for the southern Caribbean on par with Carriacou, though not quite as early. Dates are also consistent with artifact types (e.g. Troumassan and Suazan subseries ceramics) encountered in our recent survey of these sites.

DISCUSSION AND CONCLUSIONS

Until 2004, only 4 ^{14}C dates from 3 islands in the Grenadines existed with which to develop a chronology of prehistoric settlement. Our research has increased this 10-fold, providing a more refined picture of when these islands were settled and how they fit within regional chronologies in the Antilles. The suite of ^{14}C dates now available for the Grenadines suggest that similar to other islands in the southern Lesser Antilles, they were settled relatively late compared to those islands in the north (see Fitzpatrick 2006). When compared to other nearby and much larger islands such as Grenada, Barbados, St. Lucia, and St. Vincent, where several dates go back to the beginning of the 1st millen-

¹Recent reevaluation of the taxa *Strombus gigas* suggests that it should be reclassified as *Eustrombus gigas*. It is reported here as *Strombus* (*Eustrombus*) *gigas* to better follow the current taxonomic division.

nium AD (see Fitzpatrick 2006) or possibly the late 1st millennium BC, they also appeared to have been settled slightly later in time, though a new suite of dates from Barbados now seem to confirm an Archaic component that goes back to as early as 5000 cal BP.

It remains unclear why the Grenadines appear not to have been permanently settled until a few hundred years after other islands in the southern Lesser Antilles. Given their close geographical proximity, they certainly would have been visible from nearby islands, with the extensive reef systems also a likely attractant for peoples harvesting marine resources (Keegan et al. 2008). If the ¹⁴C chronologies hold true, several hypotheses could be proposed for this phenomenon. It is possible that the islands were visited occasionally to gather resources earlier in time, but only after populations began to grow and expand were the Grenadines seen as more viable locales in which to establish permanent villages. Alternatively, a dearth of freshwater sources, or technologies to extract this critical resource (e.g. pot-lined wells), may have inhibited any long-term stays. However, because the majority (36/41; 88%) of dates comes from Carriacou, additional assays from other islands are needed to determine whether this trend can be confirmed.

It is also curious why none of the dates, with the exception of the very small island of Baliceaux, extend beyond cal AD 1400 (2 σ). The later dates for Baliceaux could in fact be explained by the forced settlement of around 5000 Black Caribs to the island by the English in the 1790s. The paucity of contact period dates, however, is a phenomenon observed for various islands in the Caribbean, with some scholars suggesting this may be related to depopulation or site abandonment as a result of the breakdown of exchange networks or increase in conflict (e.g. see Allaire 1991:719; Curet et al. 2001; Hofman and Hoogland 2004).

Regardless, the corpus of ¹⁴C dates now available for the Grenadines continue to support a model of initial island colonization in the Caribbean in which peoples from South America initially bypassed the southern islands to permanently settle the northern Antilles first. This model, which we have previously referred to as the “Southward Route Hypothesis” (Fitzpatrick et al. 2010), suggests that oceanographic conditions and/or seafaring technologies played a significant role in structuring the prehistoric colonization of the Antilles from South America during the Ceramic Age (and possibly earlier), favoring initial permanent settlement of Puerto Rico and nearby northern islands to the east first. This hypothesis is supported by computer simulations of seafaring (Callaghan 2001, 2003), the remains of ancient canoes and their presumed capabilities (Callaghan and Schwabe 2001), and radiometric evidence that shows a trend of earlier dates in the northern islands that progressively become younger as one moves south (Haviser 1997; Keegan 2000; Fitzpatrick 2006). Essentially, it is argued that oceanographic and other factors encouraged or influenced peoples to take a more northwesterly trajectory from somewhere along the South American littoral to Puerto Rico and/or islands of the Virgin group and Northern Lesser Antilles first, whereupon they then migrated southward later in time.

Interestingly too, there is a rough correlation in the Grenadines between the earliest date of colonization and current island size in which the larger and southernmost islands appear to have been settled first (Table 2). As a preliminary test, we did a linear regression analysis (SPSS 13.0) to examine whether there was a correlation between the youngest (median point) available date and island size (km²). Results indicate that there is a significant positive relationship ($p = 0.049$, $r = 0.813$) between the 2 variables, i.e. the larger the island, the more likely it is have an earlier colonization date. These results are tentative, however. Presently, too few dates exist for most of these islands to reliably test an area-early settlement hypothesis. Additionally, factors including 3-dimensional area (elevation effects on island surface area), fluctuations in sea level during the Late Holocene, and coastal erosion/submersion that may have destroyed sites and/or reduced land size, will need to be considered to examine this question in more detail.

Table 2 Earliest known dates for islands in the Grenadines representing possible colonization for Grenada and St. Vincent compared to current island size (km²) (based on earliest range of 2 σ calibrations).

Island	Area (km ²)	Earliest date (cal 2 σ)	Median date (cal 2 σ)	Nr of ¹⁴ C dates
Baliceaux	1.3	AD 1310	AD 1385	3
Mustique	5.5	AD 910	AD 1035	1
Union	8.4	AD 710	AD 925	1
Carriacou	34	AD 380	AD 475	36
St. Vincent	344	AD 1	AD 330	5
Grenada	310	40 BC	AD 100	4

While a general paucity of archaeological research in the southern Caribbean has undoubtedly led to numerous lacunae in our understanding of how and when the Caribbean was settled prehistorically, the establishment of a substantial suite of 41 ¹⁴C dates for this region now provides a better framework for examining a host of questions related to how colonization strategies, settlement patterns, and cultural lifeways were structured and how they developed over the course of more than a millennium. Future research dedicated to intensively excavating these and other sites in the Grenadines will allow us to better test various hypotheses on the origins and migrations of Amerindian groups between Caribbean islands and/or South America and determine whether the chronological pattern of settlement to individual islands are real or an artifact of differential survey.

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