

Demise at the Edge of Empire: Native Depopulation in Dominica, 1493-1647

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Abstract

Demographic studies of the Island Caribbean during aboriginal and early contact times are still decidedly scarce. While some of the Greater Antilles have received attention, Hispaniola foremost of all, the islands of the Lesser Antilles have been virtually ignored. For one of the latter, Dominica, an attempt is made to estimate how many people may have inhabited the island on the eve of European intrusion and to chart native demise in the wake of first contact. Historical sources indicate that European sailors made Dominica a preferred port of call on account of its ability to furnish them with wood, fresh water, and an opportunity to rest and recuperate by bathing in the island's many geothermal springs. Native contact with crew members reported to be sick or in poor health would have provided ample opportunity for disease transmission, as would Dominica's linkages with other islands where Europeans and imported disease are known to have prevailed. By the time the French missionary, Raymond Breton, arrived on the scene in the mid-seventeenth century, Dominica's population of four to five thousand, Breton's own estimate, must have been greatly reduced from its contact size.

One could ask, 'Why are there so few of them?,' especially given the great number of their women. They answer that the Christians are the cause, since, as one of them was saying, the Spaniards twice massacred the savages of the island of St. Christopher [and] once those of the island of Guadeloupe. Only one woman and her children survived on [Guadeloupe] by taking refuge in the mountains and peopling there, so they say. [The Christians] tried to do as much on Dominica, and there massacred half the people. Since then [the natives] have been afflicted with smallpox, which they call variola, and from this some rotted and died, there not being yet any remedy for the disease. Finally, everyone either kidnaps them or kills them -- the Flemish, the English, the Spaniards, and the Allouges [Arawaks], who are their enemies.

Raymond Breton, *Relation de l'ile de la Guadeloupe* [1647]

[end p. 1]

Introduction

Father Breton's unsettling question -- "Why are there so few of them?" -- is the one we intend to ponder, even if invoking it in relation to the island of Dominica seems insignificant in the larger context of the ongoing debate surrounding native population decline in the Americas after European penetration. While a skeptic like Henige (1998) would no doubt dismiss our exercise out of hand, the fact is that the islands of the pre-colonial Caribbean remain among Latin America's least studied regions, as Butzer (1992) noted during the Columbus Quincentennial and Fewkes (1914) decades before. More recently, the assessments of Fewkes and Butzer have been reinforced by Keegan (1996), Alegria (1997), Allaire (1997), and Wilson (1997a). While, of late, advances in Caribbean archaeology have been registered, even archaeologists stress the need for more

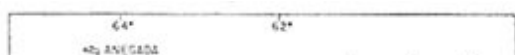
excavation and analysis. The field of aboriginal demography, however, lags well behind.¹

Nowhere has the neglect of population history been more apparent than in the case of the Lesser Antilles, especially during the 150 years following initial contact but preceding actual European colonization. Several attempts have been made to estimate the aboriginal population of Hispaniola (see, among others, Cook 1993, Cook and Borah 1971, Henige 1978, Rosenblat 1976, and Zambardino 1978), but no such exercise, as far as we know, has been undertaken for any of the Lesser Antilles. Yet, as oral testimony recorded by the French missionary Raymond Breton (1978, 1929) indicates, Antillindians alive in the 1640s retained a vivid memory of times of turmoil and tragedy dating back to the arrival on their shores of the first Europeans.² For a number of reasons, then, the small but intriguing island of Dominica is a useful starting point to estimate the size of a Native American population at contact and to gauge an approximate rate of decline in the Lesser Antilles in subsequent centuries. Though no member of his crew is recorded as having gone ashore, Columbus himself made landfall at Dominica on November 3, 1493, during his second voyage to the Indies. The Admiral instead plundered villages on the southwestern tip of Guadeloupe, one of Dominica's close island neighbors, where Columbus and his men stayed six days. Thereafter, Dominica was subjected to Spanish slave raids and quickly assumed the status of preferred port of call for other trans-Atlantic seafarers seeking fresh food, tobacco, wood, and water. Dominica's central location in the Lesser Antilles thus meant that the people of the island were exposed to regular contact with Europeans during the century and a half after Columbus and before French settlement of Guadeloupe and Martinique in the mid-seventeenth century. For the most part, European records do not document the consequences of this contact; the people of the islands, however, as Breton makes clear, did not forget. The demographic repercussions of this period of silence and memory are what this paper seeks to address.

In order to come up with a numerical range for the aboriginal population of Dominica, and to chart its demise following contact with Europeans, three procedures are followed. First, we provide a sketch of an intricate ecological setting, one in which native access to, and knowledge of, available resources was considerable. Second, we review the salient general features of pre-Columbian nutrition, health, and epidemiology, as best as they can be determined and made applicable to a Lesser Antillean situation. Finally, we consider the question of early disease transfer, arguing that diseases introduced into the Caribbean from the time of Columbus on would surely have had an impact on native population levels on islands such as Dominica, even if the historical record is silent on the matter. We are influenced in this regard by the reasoning of Dunnell (1995), among others, who observes that documented disease events in early colonial times must have been preceded by undocumented ones. Dunnell also emphasizes, as we do, that while it was certainly no disease-free paradise, the New World in pre-Columbian times had to contend with ailments that were likely to be chronic and endemic as opposed to acute and [end p. 2] epidemic. Given the scarcity of pertinent historical and archaeological sources, the argument we make is speculative, based for the most part on comparative and circumstantial evidence.

The Setting

Narrow channels separate the Windward Island of Dominica from Guadeloupe to the north and Martinique to the south (Figure 1). A small island measuring no more than thirty miles north to south and fourteen miles east to west, Dominica's topography is characterized by steep, rugged terrain, a feature that continues underwater, as a glance at a marine chart will verify. Dominica, in other words, emerges steeply out of very deep waters; in some places, soundings of seventy-five fathoms are encountered little more than a stone's throw from shore. In general, the hundred-fathom contour is found less than one nautical mile off the leeward shore, though the inshore waters of the windward coast are more shallow and slope more gradually. The hundred fathom mark, for instance, is up to five nautical miles off the northeast coast.



A central mountain range runs north to south, with lateral slopes dissected by deep ravines. Spurs often terminate abruptly in cliffs that plunge precipitously to the sea. Morne Diablotin (4,747 feet) is Dominica's highest mountain. Even with its summit concealed in mist and rain, this massive cone dominates the northern half of the island. Several other peaks tower above 4,000 feet into the looming clouds. An offshore observer's first impression of Dominica as a solid block of mountains is confirmed by a hike across its countryside. Volcanic activity is manifest by hot springs and is recorded in descriptive place names like Sulphur Springs and Boiling Lake (Caribbean 1991). Dominica's geothermal attributes, we shall see, figure in why European sailors regarded the island as a desirable place to rest and recuperate.

Dominica experiences a tropical marine climate, with average coastal temperatures of about 78°F and little seasonal or diurnal variation. Prevailing winds are northeasterly much of the year, shifting south of east during the hurricane season from July to October. Hurricane season is also a time of increased rainfall, as the intertropical convergence zone shifts north of the equator and affects the weather of the Lesser Antilles. These general patterns, however, are modified at the local level by the island's montane topography, which creates marked microclimatic variation within short distances. For example, a leeward coastal location may receive fifty inches of rain in a year, while up to three hundred inches of orographic rainfall may drench mountain peaks in the same year. Associated with this microclimatic variation are several forest types, each with its distinctive species composition. These range from a low, xeric, scrub woodland on the leeward coast through a transition zone of taller [end p. 3] deciduous trees, with some species overlap, to the humid, tall-canopied, broad-leaved ever-green forest that is generally found above 1,000 feet. Beyond 3,500 feet appear montane thickets and mossy elfin woodland, of reduced stature on account of constant wind exposure. Though there is no extensive area of mangrove in Dominica, there is a herbaceous swamp on the northwest coast. Wooded swamp formations occur along the Indian River, also in the northwest, near the town of Portsmouth. With the exception of these swamps, the majority of Lesser Antillean vegetation communities are regulated more by climatic than edaphic conditions (Beard 1949).

This is not to suggest, however, that there is no edaphic variation on Dominica. One survey recorded seventy-five different soil types on the island, ranging from strongly weathered clays to weakly weathered coarse-textured mixtures. While half these soils are considered to have good physical properties, it must be noted that seventy per cent of the island's total land base today is considered unsuitable for modern agriculture. This is due primarily to the risk of sheet erosion, though waterlogging also contributes to poor soil quality (Caribbean 1991).

Since Antillindians introduced flora and fauna from the South American mainland and modified vegetation communities in deliberate and inadvertent ways, they did not inhabit a "pristine" paradise, as Denevan (1992a) insists we realize. They did, however, occupy an island home that, together with its waters offshore, provided ample opportunities for human sustenance. Columbus considered these people "caribes;" in the mid-seventeenth century, as Breton (1929) reports, they referred to themselves as "Callinago," meaning "people of the islands."

Pre-Columbian Nutrition, Health, and Epidemiology

Pre-Columbian Native Americans did not live without the stress of poor health and disease, aspects of which were related to what they did or did not eat. Buikstra (1992), for example, has demonstrated that over-dependence on maize as a source of calories and protein predisposed certain aboriginal groups to severe health risks. She overstates the case for maize-related deficiencies, however, when she asserts that the crop "undoubtedly represented the cultivated indigenous plant of the Americas" and therefore was of "fundamental significance... throughout the Americas at the time of contact" (Buikstra 1992:87). Her sweeping generalization ignores the enormous extent of the Amazon Basin, the Guiana littoral, and the

Caribbean islands, where manioc, not maize, was the staple of choice. Post-Columbian depopulation must obviously be understood in the light of pre-contact health and nutrition. But a proposition that applies the logic of one place, time, or diet to another is simply untenable. Buikstra's analysis, in short, may hold true for much of corn-dependent, pre-Columbian eastern North America, but it does not fit the manioc-based culture of the Island Caribbean.

What of ill-health not caused by nutrition? Analyses of mummified bodies, skeletal remains, and fossilized fecal matter from the coastal deserts of Peru and Chile, so Verano and Ubelaker (1991:213) inform us, "provide conclusive evidence for the presence of infectious diseases such as tuberculosis and pneumonia," as well as indicating that pre-Columbian populations had to contend with a host of intestinal parasites. In pre-Columbian Ecuador, furthermore, they correlate an increase in health problems with more permanent agricultural settlements and less varied diets. High urban densities in the New World, Verano and Ubelaker (1991) point out, triggered similar crowd-related health difficulties as those in the Old World, ones brought on by water pollution and waste-disposal problems. Though they take note of regional and temporal variations in disease patterns and morbidity figures, they conclude that, in general terms, mortality rates were high and life expectancy short before Columbus reached American shores.

Information on types of disease, mortality rates, and life expectancy, however, is a function of the choice of place for archaeological and [end p. 4] paleopathological research. Again, care must be taken in making generalizing statements based on evidence from high density, socially stratified urban centers. Epidemiological conditions may well have been very different in less dense, more egalitarian, dispersed settlements. Arguments for poor health and reduced life expectancy based on urban crowding, agricultural specialization, and nutrient deficiency therefore simply do not apply in the case of Dominica, an island where men, women, and children would have had reasonable access to a varied and nutritious diet, one which, by today's standards, is enviable. It is more likely that the people of the islands enjoyed the robust good health that the physician, Neel (1977), documented for recently contacted, unacculturated Amazonian groups. However, given the long distance movement of people and exchange of goods in the pre-Columbian Caribbean, it is unlikely that there was not some transmission and diffusion of disease.³ The extent and impact of disease transfer would be related to the overall health and nutrition of a population, as well as the type of disease, form and distribution of settlements, and degree of interaction.

Denevan (1992b:218) contends that Caribbean islands "had relatively dense aboriginal populations." Following Watts (1987), he advances contact numbers for the entire region by doubling estimates for Hispaniola. Wilson (1997b) also reckons that the Caribbean was densely inhabited at the time of contact. Far less arbitrarily, the archaeological record testifies to long and continuous occupation. The stratigraphic tests carried out by Bullen (1967) at Grand Anse on St. Lucia, for example, indicate a long settlement history. For Dominica, Roget (1978) too found evidence of early Antillindian occupation at most of the 22 sites he surveyed. While archaeological indicators are found on both coasts, the deep, calm bays of the leeward coast appear to have been more favoured. Roget (1978:85) puts it succinctly thus: "It is clear," he writes, "that almost all of the bays of the west coast were occupied at different periods by the Amerindians."

Archaeological investigation of the Lesser Antilles has tended to focus on the identification and dating of ceramic sequences. A prominent exception is the work of Wing (1967), which establishes that pre-Columbian Antillindians had the sea-faring skill and technology to utilize deep-sea marine resources. Wing examines and identifies vertebrate remains from eight sites in three of the Lesser Antilles -- Barbados, Grenada, and St. Lucia. In addition to land-based vertebrates, Wing's analysis (1967:103-104) shows that food was secured in four marine habitats -- the beach, inshore reefs, offshore banks, and deep offshore waters, the last zone teeming with "large predacious pelagic fish, such as tunas." More than three-quarters of vertebrate remains turned out to be those of marine species, which leads Wing (1967:103) to conclude that Antillindians "depended upon a diversified fishing economy."

Subsequent research in Antigua by Wing et al. (1968) reveals similar patterns. A site there, dated between 500 and 1150 CE, again shows the importance and availability of fish protein in the Antillindian diet. Though most fish species were from coastal and near-shore reef habitats, some were pelagic species from offshore waters (Wing et al. 1968). A study of the prehistoric cultural ecology of St. Kitts discerned a correlation between population increase and the incorporation of marine resources as a dietary staple; in the pre-Columbian period, pelagic fish species, particularly tuna, constituted 40 percent of faunal remains (Goodwin 1979). The evidence further indicates a dietary shift in the prehistoric era from terrestrial fauna to marine food sources on the littoral, where high-yield mollusks were gathered. Over time, however, Antillindians "reached progressively deeper into the waters of the Caribbean, until late in prehistory they developed a significant tuna fishery" (Goodwin 1979:474). Wing and Scudder's (1980) research on St. Kitts confirms this shift from a land-based source of protein to offshore waters. At one site, up to 77 percent of the marine species represented were pelagic fish from deep offshore waters. Vertebrate remains throughout the Lesser Antilles suggest that native settlers depended on land species for [end p. 5] about a third of their animal catch. Wing (1989:144) notes, though, that with "subsequent adaptation to greater dependence upon fishing, this reliance on land animals was diminished to slightly less than twenty percent of the total catch." Long before European contact, then, Antillindians had expanded and intensified their subsistence strategies beyond the insular land base into the deep, productive waters of the Atlantic Ocean and Caribbean Sea. Though no faunal remains have been analyzed from Dominica, there is no reason to believe that deep-sea fishing methods somehow bypassed the island. Indeed, Dominica's steep underwater topography means that deep oceanic conditions and pelagic fish are encountered closer to shore than on islands with more extensive coastal shelves.

Expansion and intensification of food production from the sea, of course, has demographic implications. What, then, of land-based food production? Native Caribbean horticulture was based on, though by no means limited to, the cultivation of manioc. Manioc's versatility as a supplier of food and drink is well-known. The plant (1) is easy to propagate, (2) is undemanding of soil moisture and nutrients, (3) is not susceptible to fungal or insect damage, (4) can be harvested after as little as six months, (5) does not require a single harvest but can be stored in the ground for up to four years and harvested as needed, (6) renders high yields per unit area of cultivation and high caloric yields per plant, (7) can be processed and stored as cassava flour, and (8) can be processed into an alcoholic beverage (Sturtevant 1961, 1969; Harris 1965, 1971; Sauer 1966; Carneiro 1983; Watts 1987). Furthermore, with the exception of initial forest clearance, an excess of manioc can be produced with a minimum of labor. In a division of labor that saw women plant and men fish, an efficient base of production was secured. Even if we only consider the staples of manioc and fish -- leaving aside a long list of other roots and fruits, small terrestrial mammals, iguanas, mollusks, and crustaceans -- the caloric and high-quality protein yield of Antillindian economic production is noteworthy. If we include other available and utilized foods, the total potential nutrient yield is impressive (Petersen 1997; Burke 1998). All this has implications for aboriginal health, welfare, and reproductive potential. It seems reasonable to conclude, therefore, that the knowledge, skill, technology, and resources were in place to support a sizeable, healthy population in the Lesser Antilles, including Dominica.

The epidemiological and demographic effects of European entry into the Caribbean, while still contested, are becoming clearer. Guerra (1988) combs and interprets the documentary evidence to argue for a 1493 epidemic of swine influenza in Hispaniola. Cook (1993, 1998) is not so sure that Guerra's diagnosis is correct, but he does concur that a highly contagious disease, possibly typhus, was introduced to Hispaniola during Columbus' second voyage. Dedicated sleuthing on the part of Varela and Gil (1992), with access to documents unearthed in 1985 that have since been authenticated as transcriptions of originals written by Columbus, now allows us to diagnose the sickness as smallpox, as noted recently by Davidson (1997). Whether the disease in question was swine influenza, typhus, or smallpox -- the disclosures of Varela and Gil (1992) unequivocally point to smallpox, for Columbus himself mentions "*viruelas*" -- its impact in terms of native mortality was devastating. Whatever maladies natives were hitherto exposed to, the immediate

physical, psychological, and social effects of an unknown, highly contagious disease, not explained or accounted for by their medicine or mythology, must have been immense.

Much more was to come, including the reappearance of smallpox on Hispaniola in 1518 (Sauer 1966; Lovell 1992). Prior to that well-documented visitation, however, the natives must have been hard pressed. For instance, when Cook (1993, 1998) asks us to consider the disease environment of late fifteenth and early sixteenth-century Andalusia, he reckons that the probabilities for disease transmission are high indeed. He notes, for example, that even when plague [end p.6] raged in Seville or Cadiz, ships still set sail from these ports to the Indies. While plague, influenza, or typhus could have crossed the Atlantic at any time, measles and smallpox would require susceptible people on board to carry active cases. Such was evidently the case during Columbus' second voyage in 1493, when smallpox is recorded as having taken the lives of several Antillindian men returning home to serve the Admiral as translators after their sojourn for that purpose in Spain. "To argue," Cook (1993:230) asserts, "that illness was not transported is to assume the highly improbable." Of course, as Cook reasons, the probability of disease transmission to the Indies increased with the number of ships crossing from Spain to the Indies. Moreover, as he sifts through the documentation pertaining to these crossings, the implications are clear: between 1492 and 1518, several diseases, not just one or two, could have been transported to the Indies, where they would have consumed native populations.

The evidence for pre-1518 sickness in Hispaniola is now well-nigh incontrovertible. But did disease spread south and east from the Greater Antilles to the Lesser Antilles? Even if we are to insist that no infected Europeans went ashore to behold the New World during the stopover Columbus made in Guadeloupe in 1493, we cannot assume that early epidemics did not reach the Lesser Antilles. Given the degree of contact between the Greater and Lesser Antilles, and beyond to the South American continent, it is unlikely that sickness was restricted to the larger islands. The waters of the Caribbean were well-traveled. Antillindian traders and travelers did not have to undertake long, slow, foot journeys to conduct their business. Canoes sped along and between the islands. Far from separating them, the sea, in a very real way, linked the islands together. Rather than restricting or impeding the exchange of goods, ideas, and pathogens, the sea encouraged and facilitated it. Native numbers, therefore, must have been adversely affected in an unprecedented fashion by the arrival on New World shores of Old World disease.

In addition to the disease factor, Spanish slave raids into the Lesser Antilles also worked to reduce the population of the islands.⁴ Dominica was one of the islands designated eligible by a *real cedula* of 1511 for the legal capture of slaves. Furthermore, other European ships besides those of imperial Spain followed navigational instructions to stop at Dominica for wood, water, and refreshment. The island, in short, figured prominently enough in the scheme of empire to have constituted a potential hub of disease transmission.

How Many Alive and How Many Dead?

Given the existence of favorable conditions to support life, but also of a set of circumstances that could result in disease-induced death, we therefore ask: How many Antillindians might have inhabited Dominica before the arrival of Europeans and how many might have perished as a consequence of their intrusion?

La Borde ([1674] 1886:227, 246), who stayed among the Callinago on the island of St. Vincent, reported them to be "robust," "not badly made and proportioned," and "formerly long-lived" (Figure 2). He adds that "even if they did not get old, they died without illness." No Spaniard, alas, saw fit to record such information about Dominica, let alone offer a numerical estimate of the population. Unlike Hispaniola, not even controversial figures exist that may be mulled over and manipulated. All we have to go on are a few shreds of testimony and controlled comparisons with neighboring islands. It is hardly unproblematic, but it is the best we can do.



First, there is Coma's ([1494] 1963) that the population of the islands he visited sailing to Hispaniola from the Lesser Antilles was large. Martyr's ([1493-1525] 1912) informants indicated the same to him, but it is all very vague. Columbus, because he was low on food supplies, deliberately returned to Guadeloupe in 1496 en route to Spain, going back to the same part of the island where he and his men had anchored [end p. 7] outward bound from Spain in 1493. There, according to his son Ferdinand, he entered a village from which the inhabitants had fled, managing to secure enough processed cassava to feed 255 men for twenty days (Columbus [1571] 1992). The cassava was apparently appropriated from a single settlement and thus might indicate the number of people resident in that settlement at the time. Generally, manioc was harvested at least several times a week and processed as needed by each household on a daily basis. If we assume, then, that this amount of cassava was needed to feed the settlement for two days, a population of 2,550 is indicated. If we allow that some of the cassava would be fermented to be drunk and that it was a three-day supply, then the population of that village might have been around 1,700. Martyr's ([1493-1525] 1912) informants reported numerous small settlements in this southwestern part of Guadeloupe. If an average settlement was made up of 1,700 residents, then the overall population of Guadeloupe might indeed have been large. We know from Dr. Chanca ([1494] 1847, 1930) that one settlement in Guadeloupe contained fifty houses and others contained twenty or thirty. But unless we know the size of the houses, marriage conventions, and post-marriage residence customs, this information is of little help in estimating the number of people in a household. However, if 1,700 residents was an average number per settlement and thirty-three the average number of houses per settlement, this indicates a large household size of about fifty people. Whether these potentially large households were single-residence polygamous or extended groups of monogamous relatives is unknown.



The topography and ecology of southwestern Guadeloupe and Dominica are similar, and so settlements on Dominica could have been of a similar size. If we accept Roget's (1978) assessment that preferred pre-Columbian settlements were located on the calm leeward coast of Dominica and if all these ten identified archaeological sites were occupied in 1493, then an average settlement of 1,700 residents would result in a contact population of 17,000. However, the people of Guadeloupe from whom Columbus stole the cassava might have been preparing it in order to feast a number of visitors, and so would have stocks on hand beyond their average daily needs. In that case, attempts to estimate the size of the resident population by this method are beset with difficulty.

Another difficulty is presented by taking into consideration enslavement practices. Though few scholars deny that slavery existed, another matter entirely is the numbers it involved. According to Las Casas ([1552] 1992), more than thirty islands near Puerto Rico were depopulated [end p. 8] by Spanish raids, and more than two million people brought as slaves to Hispaniola and Puerto Rico. If we allow for exaggeration on the part of Las Casas, then we may reduce the number by a substantial half. Though slave returns from larger, more distant settlements would have been greater in the long term, it is likely that Spanish slavers started with the nearest, smaller islands. Thus, if only five percent of a total of one million slaves came from the Lesser Antilles, that figure represents a staggering 50,000.

There are no estimates of Dominica's population until the mid-seventeenth century. The French missionary Raymond Breton, who lived among the natives of Dominica for many years, was best placed to estimate their numbers. In 1647, Breton (1978:126) wrote that "the natives of Dominica number between four and five thousand." Without an archaeological benchmark and only indirect evidence from the ethno-historical record, Breton's figures constitute the only documentary base from which to project backward to the time of first contact. Backward projection, however, is fraught with problems.

Some scholars believe that, overall, Native American populations were reduced by 90 percent or more in the first hundred years of contact (Denevan 1992a; Lovell 1992; Newson 1993; Cook 1998). Decline was

particularly severe in tropical lowlands and the Caribbean (Newson 1993). A single epidemic could claim the lives of one-third to one-half of a regional population, and epidemics occurred at frequent intervals (Newson 1993, 1996). However, there were marked spatial and temporal variations in rates of decline and recovery due to social, cultural, and ecological factors as well as the characteristic life-cycle of a particular pathogen (Cook and Lovell 1992; Newson 1993). Socio-cultural and ecological variables notwithstanding, Dominica, often the landfall of choice after the voyage from Europe, must have experienced sustained population decline during the first one hundred years of trans-Atlantic expansion.

Diseases introduced by Europeans during the sixteenth century, to which Native Americans were immunologically defenseless, include smallpox, measles, typhus, plague, and influenza (Cook and Lovell 1992; Newson 1993). In the Lesser Antilles, as elsewhere, mortality rates varied depending on the pathogen or pathogens involved. In the Amazon Basin, Newson (1996) contends, size of settlements, distance between settlements, degree of social contact between neighboring settlements, and epidemiological characteristics all affected the intensity of a disease event within a settlement, as well as the rate and extent of transmission between settlements. In some cases, then, a pattern of small, dispersed settlements with little inter-settlement contact would function to alleviate the intensity and spread of disease. In these cases, smallpox, because of its long period of communicability, was probably the most lethal killer. However, this is not to diminish the impact of other diseases on small settlements, since even low mortality rates, combined with declining fertility, can drastically reduce a small population over a few generations (Newson 1996). Though the people of the Lesser Antilles lived in comparatively small nucleated settlements dispersed along the coasts of islands, this factor did not alleviate the intensity or transmission of diseases. Contrary to Kiple and Ornelas (1996), the islands in question are small and near, so the settlements were also close together. There was frequent and fast inter-settlement and inter-island social contact by canoe. In these social and ecological conditions, epidemics of varying extent and intensity must surely have ravaged the people of Dominica and the Lesser Antilles during the course of the sixteenth century.

As the number of peaceful contacts between natives and newcomers increased, so too did the transmission of diseases. Moreover, some of the European ships that stopped at Dominica departed from African ports with cargoes of African slaves and diseases endemic to that continent, such as malaria and yellow fever. In the second half of the sixteenth century, Dominica was known not only as the best place to cut wood, replenish supplies of water, and trade for food and tobacco; it also earned a reputation for the **[end p. 9]** curative and restorative power of its hot mineral springs. These geothermal springs were sought out and used to revive sick crews. There were thus numerous opportunities for the transmission of Old World diseases to the people of Dominica during this period. Let us highlight several incidents.

In 1567, Hawkins (1906) departed the Guinea coast for Dominica with a cargo of Black slaves and a crew reportedly laid low by an unidentified disease. Similarly, Drake's crew suffered high mortality from one or more diseases en route to Dominica in 1585 (Cotes in Hakluyt [1598-1600] 1904). The crews of two English ships spent a week at Dominica to trade for fresh food and to refresh their sick men with hot mineral baths in May, 1595 (Davie in Hakluyt [1598-1600] 1904). The following year, Sir Anthony Sherley headed across the Atlantic bound for Dominica. Sherley's account of a sickness that struck the voyage is quite dramatic. He writes ([Hakluyt 1598-1600] 1904: Vol. X, 272): "Before we came thither, our men fell generally downe, so that the whole could not relieve the sick; the disease was so vile that men grew lothesome unto themselves, frantic and desperately raving." Sherley arrived at Dominica on October 17 with all his crew "sick and feeble." They stayed at the hot baths until November 25 and had daily contact with the locals, whom Sherley reports treated them with "great kindness." Earlier that same year, the Earl of Cumberland (Purchas [1625] 1906) and a large fleet had brought another unidentified disease to Dominica. Many of the crew fell sick while at sea and had to be carried ashore to the hot springs, where they stayed from May 23 to June 1. If, as stated, there was daily contact with the locals, then there surely was opportunity for the transmission of disease.

These are but a few documented examples of the contacts between the people of Dominica and sickly Europeans. Even though no disease is mentioned by name, and no one recorded its effect on the Antillindians, transmission was possible; and so, too, loss of native life. The fact that some of the sickness is recorded as having originated on or off the coast of Africa is interesting, as Drake's voyage in particular attests.

Thomas Cotes (Hakluyt 1904), who mapped and later wrote up a report on this voyage, provides enough detail on disease symptoms to be suggestive. It was seven or eight days after departure from Saint Iago in the Cape Verde Islands, Cotes tells us, that the disease erupted. Mortality was high, with two or three hundred dead in a few days, most presumably African slaves. According to Cotes, people were afflicted with extremely high fever and agues. In addition, some of the dead had spots on their skin, which Cotes associated with the plague. Possibly more than one disease was present. Drake chose not to stay long on Dominica because he did not trust the "caribes;" Cotes, however, mentions that they were treated kindly. The "caribes" traded tobacco and cassava and helped Drake's men fill and carry barrels of fresh water from the river to the ships. Drake claimed to have made a fast passage of eighteen days across the Atlantic. It is clear that the disease, or diseases, had not yet run their course, as Drake left Dominica for St. Kitts to clean and air the ships and to refresh the crews who were still sick (Hakluyt [1598-1600] 1904, Vol. X). Might this have been an early bout of yellow fever, and not typhus, as Crosby (1972) thinks is the case?

No one who visited Dominica, or any other Lesser Antillean island at the end of the sixteenth century, claimed that there were large numbers of "caribes." However, the one estimate from around this period by a Spanish friar is probably too low. According to John Stoneman, the pilot for Henry Challons on a voyage to Virginia in 1606, an English ship took on board at Dominica one Friar Blaseus, who claimed to have been held captive on the island during the previous sixteen months. Stoneman seems to have some doubts, either about his understanding of Friar Blaseus or about the friar's estimate. He reports that, according to Blaseus, the population of the islands between Guadeloupe and Grenada, "as neere as we could understand, was scarce one **[end p. 10]** thousand of all sorts of men, women, and children" (Purchas [1625] 1906: Vol. XIX, 284-87). Stoneman's skepticism about the friar's estimate is probably well-founded. Friar Blaseus did not claim to have visited all the islands, and so the accuracy of his estimate is questionable. Indeed, Friar Blaseus claimed to have found alluvial gold on Dominica, and his low estimate may have been motivated more by the will to promote settlement than by familiarity with the islands or the numbers of people on them. Friar Blaseus possibly based his estimate on some knowledge of population decline the preceding century.

The documentary evidence for a complete and exact chronology of disease introductions to the Lesser Antilles may be lacking, but the cumulative impact of disease was not. While no European recorded the demographic devastation of the period, the people of the islands did not forget. The ancestors spoke, through the oral history recorded by Breton ([1647] 1978), of the time when the people died, rotting from disease. The end was not yet in sight; while Breton was writing, the first recorded epidemic of yellow fever was raging in Barbados, from where it spread to other islands (Ligon 1657). Only 27 years later, La Borde ([1674] 1886) would write that the caribes "are no longer to be feared, for many have been killed." The population had been further reduced, according to La Borde's estimation, from 4,000 on Dominica alone, to 4,000 on two or three islands.

If, instead of 90 percent, we opt conservatively for a 70 percent decline in the population of Dominica between 1493 and 1647, then Breton's estimate of 4,000 to 5,000 yields a contact population of between 13,300 and 16,700. From an ecological or carrying-capacity perspective, these numbers could readily be sustained under aboriginal conditions of knowledge and technology (Burke 1998). Factors other than disease, however, complicate projections from the 1647 baseline.

Spaniards certainly raided the Lesser Antilles for slaves. Not only European documents but also Callinago oral history evoke these episodes (Breton [1647] 1978). While the primary cause of depopulation was disease, people were also taken as slaves. Another factor complicating the estimation of Dominica's contact population is migration. At the time Breton made his reckoning, the population of Dominica had increased through immigration. People displaced by colonization on islands like St. Kitts and Guadeloupe had found refuge in Dominica. Though Du Tertre ([1667] 1958) offers no numbers, he reports that people who had fled Cuba, Hispaniola, and Puerto Rico could also be found living on Dominica. It is also likely that, after years of enduring death from disease and slave raids, some people decided to sever their ties to the islands and face unknown prospects on the mainland. Breton's estimate, therefore, must be evaluated not only in the light of death by disease but also slave losses, immigration from other islands, and emigration to the mainland.

Conclusion

When Columbus first sighted, in 1493, the forested mountains of Dominica, between 13,000 and 17,000 Antillindians might then have inhabited it. While, to be sure, the ways in which we arrive at this figure are methodologically crude, they at least converge around this range. These numbers yield a density of seventeen to twenty-three persons per square kilometer. Under aboriginal conditions, this density was comfortably sustainable, with a capacity for increase. It is possible, then, that the number of people alive on Dominica in 1493 was closer to, or even above, the higher figure of 17,000, which is still well within the means and methods of production and the available extent of cultivable land. To our knowledge, no one has attempted to calculate a contact population for Dominica or, for that matter, any other island of the Lesser Antilles.⁵ There is little basis for comparison, as previous estimates have treated the Lesser Antilles as a group. To place our reckoning in Caribbean context, Denevan (1992b), influenced by Zambardino [end p. 11] (1978) and Watts (1987), has suggested a contact population for all the islands, excluding Hispaniola, of two million.

Assuming a similar range of subsistence options and manioc as a staple, useful though very broad comparisons can also be made with sixteenth-century Amazonian populations. Denevan (1992b) calculates that on large Amazonian flood plains, where the soil is more fertile and there is access to fish protein, density was 18.2 people per square kilometer in 1540. A Dominica population of 13,000 to 17,000 gives a comparative density range of seventeen to twenty-three people per square kilometer. Thus comparison of habitat density also yields a similar range. Watts (1987) suggests that, in manioc-based subsistence horticulture, from 0.2 to 0.5 hectares of land is required to sustain one person over a year. Based on the midpoint of the estimated population range for Dominica (15,000), and using the 0.2 to 0.5 hectare multipliers, from 3,000 to 7,500 hectares would have to have been under cultivation at anyone time. However, Dominica's fertile soils, diverse aboriginal cultivation, and ready access to fish protein probably means that land requirements per person per year would likely be in the middle of the range, at 0.35 hectares per person. At this figure, a population of 15,000 would have needed 5,250 hectares of land in cultivation at any one time.

To demonstrate the flexibility and resilience of aboriginal horticultural production, a comparison with contemporary export-oriented agriculture on Dominica is instructive. Of Dominica's total 79,000 hectares, 22,000 hectares were under cultivation in 1980. It was proposed, at that time, to raise the figure to 23,700 hectares by the year 2000. This was considered the limit of agricultural production, since 45,000 hectares of the land mass is deemed to have very high or moderately high erosion risks, due to steep topography. As recently as 1984, and not very different today, 51,770 hectares or sixty-five percent of Dominica's land mass was covered in mature and secondary humid forest, deciduous, scrub, and littoral woodland. As much as 29,100 hectares of this total is mature humid forest at high elevations (Caribbean 1991).

It therefore seems reasonable to conclude that, when Columbus arrived, aboriginal production was well within the capacity of the land and that Dominica would have supported a well-adjusted, well-provided-for

population. Things changed dramatically, for the worse, soon thereafter. When the French finally settled Guadeloupe and Martinique in the mid-seventeenth century, they encountered a much-reduced population on Dominica and throughout the Lesser Antilles.⁶ Given these circumstances, it is remarkable that Antillindians were able to insert themselves, politically and militarily, between French and British colonists to resist European settlement on their island home that Columbus called Dominica.

Notes

1. A foray into the field of historical demography, for the island of Dominica in particular, is part of a larger reconstruction of native land and life there undertaken by Burke (1998) in his M.A. thesis.
2. Coining the term "Antillindian" is meant neither to complicate matters with unnecessary jargon nor to evade the debate on ethnic identity and political allegiance in the Caribbean. Rather, it is a refusal to perpetuate the widespread but misleading term "Island Carib." While ethnic identity as "Callinago," meaning "people of the islands," is appropriate for the seventeenth century, it is uncertain whether this ethno-political construct was current at the time of first European entry. Hence our use of the geographically specific term "Antillindian" rather than resorting to more generic or inappropriate nomenclature.
3. On long distance trade networks between the islands and the South American mainland, see Boomert (1987, 1995) and Watters (1997). See also Price (1966) on the transfer of maritime skills and technology from the Callinago to African slaves in the Lesser Antilles.
4. On slavery in the islands, see Sued Badillo (1992, 1995).
5. Drewett (1991), though familiar with the archaeology of Barbados, concedes that there is no real evidence on population size but guesses a late pre-historic population of between 5,000 and 10,000 for that island. Cooper (1997), without calculation or citation, suggests a contact population for St. Croix in the Virgin Islands of 3,500. Keegan (1996), based on archaeological site distribution, **[end p. 12]** accepts Martyr's reports of 40,000 people in the Bahamas at contact time. Given the different physiographic contexts, it is likely that fertile, montane Dominica supported a larger population than anyone of the Virgin Islands or any of the Bahamas.
6. Dominica and St. Vincent were the strongholds of Callinago resistance to European colonization of the Lesser Antilles. In 1903 the British colonial authorities established a 3,700-acre reserve on the northeast coast of Dominica for the remaining Antillindian population. Upon attaining political independence in 1978 the Dominica government granted official title for this land, now called the Carib Territory, to a Carib Council. During the last decade there has been a resurgence of ethnic identity as Callinago and a movement towards cultural revival (Burke 1998). Barreiro (1990) estimates the number of ethnic Callinago on the territory to be 3,000.

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Resumen

Son pocos los estudios demográficos sobre las Islas del Caribe para la época precolombina y para el período de los primeros contactos europeos. Aunque han sido estudiado algunas de las Islas Mayores, Española más que cualquier otra, las Islas Menores han recibido muy poca atención. Para una de estas últimas, Dominica, intentamos llegar a una estimación de su población en vísperas de la invasión europea y discutir el tema de la despoblación indígena en los años y décadas posteriores. Las fuentes indican que los marineros europeos eligieron Dominica como punto de asentamiento predilecto tras el viaje transatlántico, porque la isla poseía recursos de madera y agua potable y ofrecía la oportunidad de descansar y recuperarse aprovechando la existencia de pozos geotermales. El contacto de los indígenas con los marineros, documentados como enfermos o en condiciones de mala salud, ocasionó la transmisión de enfermedades. Asimismo, los contactos entre Dominica y otras Islas crearon condiciones para la difusión de las enfermedades introducidas por los europeos. Cuando, a mediados del siglo XVII, el misionero francés Raymond Breton llegó a Dominica, su población (según él) de entre cuatro y cinco mil habitantes, se debió haber reducido bastante desde el momento del contacto.

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