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Patterns of paleomobility in the ancient Antilles: an isotopic approach
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SUMMARY

Patterns of paleomobility in the ancient Caribbean were studied through an interdisciplinary approach using a combination of archaeological, osteological, mortuary, and isotopic data. Samples of human dental enamel from 360 individuals from multiple sites spanning a broad range of geographic and temporal contexts in the Caribbean were analyzed for strontium isotope composition. These results were interpreted in reference to a database of strontium isotope variation for the Caribbean biosphere created especially for this purpose through the analysis of 288 modern and archeological animal and plant samples. These combined strontium isotope datasets contributed to assessments of the spatial patterning of bioavailable strontium isotope variation in the region and to estimations of the local range of strontium isotope variation for the different site populations included in this study. These ranges contributed to determinations of whether individuals were of local or nonlocal origin. These results were then subsequently analyzed to examine inter- and intra-population variation in patterns of migration, with a specific focus on testing possible relationships between residential origins and biological sex, age at death, chronology, grave goods, and dietary practices. Finally, carbon and oxygen isotope analyses of dental enamel were conducted on 50 individuals representing a subset of several of the larger human sample populations to assess the potential of these isotope systems for provenance studies in the Caribbean region and for investigating the origins of suspected long-distance migrants.

The main findings of this research project have greatly increased our understanding of isotopic variation in the region and perhaps more importantly have shed unprecedented light onto the individual life histories of the ancient inhabitants of the Caribbean. First, in reference to the biosphere mapping component of this research project, bedrock weathering appears to be the dominant source of strontium to most local terrestrial ecosystems in the Antilles but substantial contributions of non-geological strontium from the atmosphere and the sea significantly alters bioavailable strontium isotope ratios in many areas of this region, especially in the smaller volcanic islands of

the Lesser Antilles. This tendency greatly reduces the utility of using geological isotope data as proxies for estimating strontium isotope ranges in terrestrial Caribbean ecosystems and highlights the importance of utilizing biosphere isotope data in maritime settings. Second, the employed method was successfully applied to identify nonlocal individuals, who were present amongst each of the larger sample populations included in this study. However, the number, proportion, and origins of the nonlocals are highly variable both within and between different populations. Third, although nonlocals are represented by both females and males, there is a bias observed in migration behavior related to biological sex with a larger proportion of nonlocal females amongst nearly all of the prehistoric sites included in this study. In contrast, the opposite pattern was found at the single protohistoric site that was studied where substantially more males than females were identified as nonlocal. Third, there was also a pronounced age-based component to migration behavior in the ancient Antilles, with consistently greater numbers and proportions of nonlocal adults compared to nonlocal subadults. Fourth, although few clear patterns were revealed in terms of correlations between residential origins and many aspects of mortuary treatment, a very intriguing correlation was demonstrated between the presence of foreign or exotic grave goods and nonlocal individual origins. These types of grave goods were more often associated with nonlocals at a number of sites and were found almost exclusively with nonlocal females at the prehistoric site of Anse à la Gourde, Guadeloupe. Fifth, little chronological clustering was observed amongst the nonlocals at each site such that most nonlocals for whom radiocarbon dates were available were temporally dispersed throughout each site's occupation and thus very few were contemporaneous with each other.

Additionally, few systematic differences in dietary practices were observed between local and nonlocal groups amongst each of the site populations. However, at the scale of individuals, the most extreme bone carbon and nitrogen isotope values were consistently associated with nonlocal individuals. Furthermore, these dietary outliers were also fairly heterogeneous even within a single site population. Given the documented spatial patterning of carbon and nitrogen isotope values amongst the prehistoric populations of the Caribbean, the distinct dietary isotope values of some nonlocals possibly indicate natal origins from islands or regions with divergent dietary practices.

The enamel carbon isotope results provide some initial support for this hypothesis for a few of the nonlocals identified in this study that possess enamel carbon isotope ratios that are very different from their bone isotope values. Nonetheless, in general, both the oxygen and carbon isotope results from ancient Caribbean human enamel samples display limited intra- and inter-population variation with the exception of three nonlocal individuals from the site of El Chorro de Maíta, Cuba. Two of these three individuals had been identified as possibly foreign-born individuals originating from Mesoamerica and Africa based on multiple lines of evidence including distinct burial treatment, and a distinctly modified cranium and dentition for the former and morphological characteristics of the skeleton and a relatively high strontium isotope composition for the former. Both of these individuals also possess enamel oxygen isotope values that are significantly lower than those found amongst archaeological populations from the Caribbean, and enamel carbon isotope values that are extremely elevated relative to prehistoric Caribbean populations. Thus the oxygen and carbon isotope data from these two individuals not only support the initial assessment of their nonlocal origins but these data are also consistent with the proposed regions of origin. Furthermore, these results have also permitted a more detailed exploration of possible natal origins within these larger macro-regions.

Therefore, the totality of the evidence, particularly the dispersed radiocarbon dates and highly variable strontium isotope ratios of most nonlocals, is inconsistent with a model of migration characterized by migration 'events' or 'waves', such as colonizations or migrations of large groups arriving from the same origin. Instead, the combined evidence is more consistent with multiple, cross-community migrations of small groups or individual settlers immigrating from disparate origins into already established communities. In summary, this study has revealed the existence of complex and dynamic patterns of migration and mobility in the ancient Antilles. Despite some degree of variation between the different populations, overall past migrations seem to have been at least partly structured by sex and age; differential origins seem to have had implications for how individuals were treated in death; and most of the studied communities were comprised of individuals with variable origins. Many of these ancient migrants likely originated from within the same island or region where they were ultimately interred,

while a smaller yet substantial proportion probably migrated from other islands in the Caribbean, but a few of these individuals were migrants who voyaged from various, distant homelands and contributed to the diversity that characterizes the Caribbean's past and present.