Supplementary text 1: Size estimations, isotopic analysis methodology, FRUITS dietary mixing models, collagen data, Caribbean isoscapes, enamel data

METHODS

*Size estimations – calculating withers height*

The determination of withers height (WH) has the greatest utility in assessing variability in size between individuals and of reconstructing the morphological characteristics of dogs (Clark 1995). Statistically reliable estimations of withers height can be determined from the calculation of cranial dimensions (Chrószcz et al., 2007), metapodia length (Clark, 1995), and long bone length (Harcourt 1974). All three sets of formulae were employed in the calculation of withers height for three individuals recovered at El Flaco (n=2) and El Carril (n=1).

The morphology of individual buried dogs from the islands of Basse-Terre and Grande-Terre in Guadeloupe, and Barbuda is recorded in the publication by Grouard et al. (2013), which also includes data recorded by Lawrence (1977) of five buried dogs from the Dominican Republic. In addition, a further two individual withers heights (WH) were calculated from remains recovered at the sites of El Flaco and El Carril (Shev 2018). These morphological indicators allow a cross-comparison between the stature and isotopic values denoting diet and mobility of pre-Columbian dogs.

Two complete *C. familiaris* skeletal elements from El Flaco allowed WH estimations; a fifth metacarpal (FND 2821) recovered from Layer 1, Unit 69, and a crania, FND 2270 (Figure 2b, c), that was recovered in burial contexts (Shev, 2018). The latter element was recovered alongside two pelvic bones (Figure 2d) likely from the same individual and was found to be in contextual association with 18 human burials that dated to between cal AD 1250 to 1490 (Hofman et al. 2018; Hofman and Hoogland 2015; Keegan and Hofman 2017:128-129).

A disarticulated skull from El Flaco (FND 2270) from which the distance between the ethmoideum and basion was 65.27 mm, allowed WH to be calculated following the regression formula outlined by Chrószcz (2007). An isolated fifth metacarpal (FND 2821) had a total length (GL) of 44.15 mm, from which WH was estimated following Clark (1995). The withers heights of these two samples have been compared to the statures of dogs (Table 2) outlined in Grouard et al. (2013).

The two dogs (El Flaco (FND 2270, FND 2821) from the Dominican Republic (from Shev 2018) are 351mm, and 417mm in height. The first one is smaller than the burial dogs from the Dominican Republic (from Lawrence 1977), that were already the smallest dogs from the Caribbean. Consequently, the dog from El Flaco FND 2270 is the smallest dog ever measured in the Antilles. El Flaco FND 2821 is within the average range of the 18 measured dogs.

Morphological reconstructions indicate that the only buried dog from El Flaco was of similar stature to others that have been recovered from archaeological sites in the Dominican Republic (Grouard et al. 2013; Lawrence 1977). In contrast, the remains of two dogs recovered from non-burial contexts at El Flaco were from individuals of a considerably taller stature (Shev 2018). This is in line with Columbus’ assessment of the existence of two breeds of dogs in the Caribbean. However, a thorough assessment of whether there may have been an indigenous preference for burying smaller dogs requires the gathering of additional osteometric data of dog remains from both burial and domestic contexts.

As the osteometric data suggests, two distinct breeds of dogs possibly existed in Hispaniola prior to the arrival of Europeans, and although their overall diets were similar there may have seemingly been a preference for the burial of smaller dogs. According to Las Casas, it was this miniature breed that was likely called *‘aon’* by the Taíno of island of Hispaniola that was the preferred breed which was habitually lavished with affection (Las Casas 1876[1561]).

*Isotopic analysis methodology*

A selection of canid remains underwent isotopic analysis using standard procedures and protocols for archaeological skeletal materials as detailed elsewhere (Laffoon et al. 2015; Laffoon et al. 2017). Carbon isotope (δ13Cen) values from tooth enamel, and carbon (δ13Cco) and nitrogen (δ15N) isotope values from bone collagen were obtained in order to assess paleodiets of select individual dogs. To assess mobility patterns affecting dogs from the region, strontium (87Sr/86Sr) and oxygen (δ18O) isotope values were obtained from dental enamel. Note that the analysis of δ18O values has demonstrated little potential as a proxy for determining provenance in the insular Caribbean, and oxygen isotope values appear to have little correlative relationship with 87Sr/86Sr values (Laffoon et al. 2013). Oxygen enrichment in organisms is also dependent on the sources of water utilized, metabolic differences between individuals of the same species, with the additional problem of consumption of C3 plants enriching oxygen values compared to that of C4 plants (Kohn 1996. These significant variables mean that oxygen isotopes can have limited application for determining provenance in certain regions, therefore it is often better to corroborate oxygen with other isotope proxies such as carbon and strontium (Sharpe et al. 2018).

Given that carbon isotope values from enamel illustrate whole diet whilst collagen is more representative of protein intake (Ambrose and Norr 1993), these data sets have been analyzed separately as they denote different dietary aspects, with the notable exception for the few samples (n=4) for which both collagen and enamel data were available. Not every tooth sample was subject to both carbon and strontium analyses, therefore some samples are better illustrative of origin, whilst others purely denote dietary intake. Another consideration concerning limitations is the efficacy of conducting bulk analysis of isotopic data from sites that are temporally and geographically distant, this has been taken into account when interpreting the data. Where applicable, outlying values were excluded from the analysis of certain criteria when testing for statistical significance.

As a caveat, the assessment of the localness of a specimen must also take into consideration the overlap in bioavailable 87Sr/86Sr values throughout the insular Caribbean (Laffoon 2012), therefore organisms that are deemed local may in fact originate from different localities with similar baseline 87Sr/86Sr values (e.g. false negatives). For example, an organism deemed as local to the site of El Cabo in the eastern Dominican Republic could potentially have originated from a coastal location in Puerto Rico that demonstrates similar isotope baseline ranges (Bataille et al. 2012; Laffoon 2012).

*FRUITS dietary mixing model*

The use of mixing models for isotopic dietary reconstructions have been steadily increasing in recent years (see Parnell et al. 2013). For this study, we applied a multi-source mixing model to obtain quantitative estimates of the relative proportions of different foods to individual dog diets. Dog stable isotope data were analyzed with the Bayesian mixing model software FRUITS (Food Reconstruction Using Isotopic Transferred Signals) v2.1.1 (Fernandes et al. 2014). Food source isotope data was extracted from the compiled foodweb isotopic data set for the Caribbean from Pestle (2010). From this database, we extracted the relevant isotopic data for all plant and animal species that are native to Hispaniola and surrounding waters. All other model input parameters are identical to those presented in Pestle and Laffoon (2018). In order to implement dietary mixing models both enamel and collagen isotopic values need to be available. Sufficient isotopic data was available four such dogs: one from El Flaco, Dominican Republic, two from Morel and one from Cathédrale de Basse-Terre (CBT5002), Guadeloupe.

All four dogs have analogous diets, although with some limited inter-individual variation (Figure 6; Table 3). The Greater Antillean sample from El Flaco (FND2270) seems to have been consuming higher proportions of terrestrial animals than the Lesser Antillean samples, although also seems to be consuming more proteins in general, including marine-sourced foods when compared to the other three individuals. In terms of withers height, the buried individual from El Flaco (351 mm) is of considerably shorter stature (Table 2), however this size disparity can perhaps be accounted for given the temporal and geographic distance between the samples having been recovered from a Late Ceramic Age site in Hispaniola compared to the other three individuals who were all from Early Ceramic Age sites in the Lesser Antilles. Surprisingly, regardless of distinctions in geographical distance and time period all four dogs appear to be consuming much more plant food in general (especially C3 plants) than animal food. In fact, for the three Lesser Antillean samples, the proportion of plant to animal food consumption is roughly 3:1.

*Collagen Isotope Data*

Collagen samples extracted by Shev (2018) from dog skeletal remains from El Flaco (n=10), El Carril (n=3) in the Dominican Republic, Cathédrale de Basse-Terre (n=2) and Morel (n=6) in Guadeloupe, and Hope Estate (n=1) in Saint-Martin were analyzed for δ13Cco and δ15N values (Figure 3). Five samples did not contain sufficient collagen (Morel 2732, El Flaco FND 731, 2610, 2838; El Carril FND 716), and of the 24 successful extractions three samples (Morel 2734; Morel 2728; HE3305B) demonstrated C:N values outside the accepted range according to criteria outlined by Ambrose (1990), and another sample (HE2503C) did not produce a reliable measurement. None of these samples were considered further.

The mean collagen values for all samples were δ15N 9.8‰ and δ13C -18.2‰with a range of 4.9‰ for nitrogen and 4.1‰ for carbon. Between the Greater Antilles and the Lesser Antilles there are broad similarities, with both regions demonstrating similar overall means in both carbon and nitrogen (G. Antilles: δ15N = 9.7‰, δ13Cco = -18.1‰; L. Antilles: δ15N = 9.9‰, δ13Cco = -18.4‰) as well as for the median and range of the values. This similarity in mean values is also reflected in the assessment of burials (δ15N = 9.6‰, δ13Cco = -18.6‰) relative to non-burials (δ15N = 9.9‰, δ13Cco = -17.9‰) although the carbon isotope values of non-burials are slightly higher overall.

The variance of nitrogen isotope values of non-burials (σ2 = 3.21) is considerably greater than that of burials (σ2 = 0.47), however a *t-*test (critical t value = 2.0639; p = 0.36819) indicated that there is no significant difference between the means of both groups.

*Strontium isoscape limitations*

The analysis of strontium values coupled with known and estimated regional isoscape data (Bataille et al. 2012; Laffoon et al. 2012; Laffoon et al. 2017; Pestle et al. 2013) permits the determination of whether individual dogs were raised local to their respective excavation sites, or whether they were of nonlocal origin. Certain limitations in terms of calculating potential local ranges were apparent as the local ranges of some sites are currently unknown. This is the case for Punta Candelero, Puerto Rico (87Sr/86Sr 0.7050 – 0.7092), La Poterie, Grenada (0.7062 – 0.7090), Silver Sands, Barbados (0.7081-0.7093) and for Hope Estate, Saint-Martin (0.7071 – 0.7092) where the local ranges for the whole islands in which these sites are located were used to determine localness.

*Enamel results: Local versus nonlocal – results per island*

Percentages of nonlocal individuals were at 23.1% (n=3) for Morel and 33.3% (n=1) for Anse à la Gourde in Grande-Terre, Guadeloupe; 50% (n=1) of samples at Silver Sands, Barbados; 42.9% nonlocal at both El Flaco (n=3) and El Carril (n=3), Dominican Republic; and one individual (20%) from Hope Estate, Saint-Martin was determined to have nonlocal origins. Sites not mentioned contained dogs that were determined to be purely local in origin, this includes the two individuals from Punta Candelero, Puerto Rico and the five analyzed dogs from La Poterie, Grenada, however as aforementioned due to the application of island-wide baseline strontium isotope values to these two sites there is potential for a few of these samples to have had alternative natal origins.

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