The Bridge River Dogs: Interpreting aDNA and Stable Isotope Analysis Collected From Dog Remains

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INTRODUCTION

Excavations at the Bridge River site in the Middle Fraser Canyon, near Lillooet British Columbia, have been on-going since 2003. Semi-subterranean, circular houses covered a shared living space divided for social purposes, such as cooking or tool production. Excavations at the Bridge River site in the Middle Fraser Canyon, near Lillooet British Columbia, have been on-going since 2003. Semi-subterranean, circular houses covered a shared living space divided for social purposes, such as cooking or tool production.

METHODS

The samples were sent to the Ancient DNA Laboratory at the Simon Fraser University in Vancouver, British Columbia, for aDNA analysis performed by experienced Ph.D. student Anna Marie Prentiss under the supervision of Professor Meradeth Snow. After aDNA sampling, samples were transported to the Archaeological Isotopes Laboratory at the University of British Columbia Vancouver campus for isotopic analysis, focused on carbon and nitrogen levels, by experienced Ph.D. student Alejandro Diaz under the supervision of Professor Michael Richards (2015).

RESULTS

Successful amplification of Canis aDNA and haplotype identification was possible in five samples, matching identically to the Canis lupus familiaris reference sequence of C. lupus familialis mtDNA haplotype (Diaz 2015). ADNA results showed no discernible difference.

Stable carbon and nitrogen isotope values were collected from 15 Canis samples and 45 comparative faunal samples (Figure 1). The fifteen samples identified as belonging to the genus Canis through morphological comparison were separated into two distinct groups with unique stable isotopic values. Nine representing C. lupus familiaris (dog), three of the nine samples were also identified as C. lupus lupus in aDNA analysis, the six remaining Canis samples clustered near boreal woodland samples, and were assumed to represent C. lupus lupus (Diaz 2015). Only five samples were applicable for the comparison of housepits in the northern versus the southern portion of the village. Of these five samples, four represented the northern village from HP 24 and 54, and one from the southern village from HP 24. Stable isotopic values were interrelated and showed no discernible difference.

DATA

All faunal remains were identified through morphological comparison. Twenty Canis skeletal elements were selected with another 128 faunal samples representing sockeye salmon (O. nerka), rainbow trout (O. mykiss), mule deer (O. hemionus), sheep (Ovis aries), and bear (Ursus arctos) for stable isotope comparison (Figure 1). Free of the six housepits excavated were sampled in this study. HP 24 and 54 are located in the northern area, where HP 11, 16, and 20 are positioned in the southern area.

Stable carbon and nitrogen isotope values were collected from 15 Canis samples and 45 comparative faunal samples (Figure 2). The fifteen samples identified as belonging to the genus Canis through morphological comparison were separated into two distinct groups with unique stable isotopic values. Nine representing C. lupus familiaris (dog), three of the nine samples were also identified as C. lupus lupus in aDNA analysis, the six remaining Canis samples clustered near boreal woodland samples, and were assumed to represent C. lupus lupus (Diaz 2015). Only five samples were applicable for the comparison of housepits in the northern versus the southern portion of the village. Of these five samples, four represented the northern village from HP 24 and 54, and one from the southern village from HP 24. Stable isotopic values were interrelated and showed no discernible difference. Change in diet in a single household was investigated by compiling HP 54 dog samples into two groups, BR 2 and BR 3. Treat for the differential between BR 2 and BR 3 showed 87% were statistically significant different (p-value < 0.0025), while 87% were not (p-value 0.185). Possible subsistence changes were also investigated through a floor-by-floor analysis of deer samples.

DISCUSSION

Bridge River dog’s mtDNA haplotype, Haplotype 2, is genetically most closely related to those in Clade A dogs descended from East Asian wolf stock and derived from one of the founding haplotypes of dogs in the New World (Leonard et al. 2002; Swadchenya et al. 2002). Results mirrored previous results, linking the dogs to other Northwest coast sites like Namu and Disenos Point (Barri et al. 2006; Call 2011). The current results were collected from samples in the entire BR 2 occupation, suggesting Hap 2 was present in the village longer than previously thought. The prevalence of this mtDNA at the site could reflect a lack of female dogs being traded or otherwise introduced to the village; however, this interpretation assumes mtDNA haplotype variation in the region. Given the identification of two other haplotypes, F Hap and B Hap, at Kaneset Creek, only miles from Bridge River, some haplotype variation, though potential limited, is suggested for the region. The small sample size included here may explain the lack of other haplotypes being identified. The lack of differentiation between the stable isotopic values of the southern and northern regions of the village may reflect similar diets, or the lack of recognizable prestigious food consumption. It has been suggested that mammal meat composed the most sought after food, and would be linked to signs of wealth (Prentiss et al. 2012). Dog stable isotope results suggest diet composition of meat. This suggests that certain terrestrial meats may have been considered prestigious, and they may not be easily distinguishable in stable isotope values.

The average dog 87C is 88.25‰ in BR 2 and 88.35‰ in BR 3. The difference in average dog 87C values between BR 2 and BR 3 was 0.07‰, and while this change is statistically significant (P-value < 0.0025) it is still slight and likely a result of minor climatic changes taking place between the BR 2 and BR 3 periods, on an artefact of the limited sample size. Subsistence changes were also assessed through a floor-by-floor analysis of deer stable isotope samples (Figure 4). Deer samples showed complementary trends to those seen in Walsh’s dental analysis, with noticeable fluctuations just prior to the end of BR 2 and at the end of BR 3. This suggests the data at these times were binned from different ecological zones, possibly as a result of depleted local resources due to increased population.

CONCLUSION

Results provided more evidence for a lack of variation of diet in the Bridge River village and the Middle Fraser River Canyon. Stable isotopic values added further support to archaeological evidence of changing subsistence strategies in response to changing village demographics. This study and others like it strive to gain a better understanding of the complex relationship between the people at Bridge River, and the community’s interactions with the changing environment around them.