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 occupied a shared living space divided for social purposes, such as cooking or tool production. Village organization shifted from the Bridge River (BR 2) period, 1,600 to 1,500 cal. B.C., to the Bridge River 3 period (BR 3), 1,300 to 1,000 cal. B.C. During BR 3, the village core peak occupancy and was arranged in a circular pattern, with a noticeable separation between northern and southern areas (Prentiss et al. 2012; Prentiss et al. 2014). Analysis based on material culture in excavated housepits suggests the village’s northern half housed wealthier homes than those in the south (Prentiss and Kuijt 2015). Recent zooarchaeological evidence also suggests the village core went through two periods of subsistence related areas with associated population growth, the first just prior to the end of the BR 2 period, and the second near the end of the BR 3 period (Walsh 2015). Excavations at the two northern housepits have uncovered significant evidence of domesticated dogs, Canis lupus familiaris. Dogs played an important role in the everyday life of the villages through functions including transportation labor, hunting aids, protection from other animals, companionship, and hair for weaving (Toit, 1906).

This study was focused on the comprehensive interpretation of dog aDNA and stable isotope analysis. Three research questions were posed, the first in consideration of aDNA and the latter two in consideration of dog stable isotopes as a rough proxy for their human owners. Samples were chosen to best address these questions.

1. Where do the mitochondrial DNA (mtDNA) haplotypes of Bridge River dogs fit into the phylogeny created from other prehistoric dogs in British Columbia?
2. Can social inequality be seen through distinctive changes in the diets of dogs during different phases of a household's occupation?
3. How does dog diet change through various occupations of a single household and how is it correlated to changes in the faunal assemblage?

RESULTS

Successful amplification of Canis aDNA and haplotype identification was possible in five samples, matching identically to the Genbank reference sequence of Canis lupus familiaris mtDNA haplotype 4 (Rodrigues 2015). 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 isotope values. Nine representing C. lupus familiaris (dog), three of the nine samples were also identified as C. lupus lupus (wolf). Samples were assumed to represent C. lupus (dog). Three of the nine remaining Canis samples clustered near herbivore faunal stable isotope values, and were assumed to represent C. latrans (squirrel) (Figure 2). Only five samples were applicable for the comparison of housepits in the northern versus the southern portions 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 20. Stable isotope values were collected and showed no discernable 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 difference between the two groups was 0.43C‰  and while this change is statistically significant (P-value < 0.0010) it is still slight and likely a result of minor climatic changes taking place between the BR 2 and BR 3 periods, or an artifact of the limited sample size. Subsistence changes were assessed through a fish bone analysis of deer stable isotope samples (Figure 4). Deer samples showed complementary trends to those seen in Walsh’s faunal analysis, with noticeable fluctuations just prior to the end of BR 2 and at the end of BR 3. This suggests the deer at these times were hunted from different ecological zones, possibly as a result of depleted local resources due to increased population.

CONCLUSION

Results provided more evidence for lack of variation of diet in single housepits in the Bridge River village and the Middle Fraser River Canyon. Stable isotope values added further support to archaeological evidence of changing subsistence strategies in response to changing village demographics. This study and others like it serve 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.