A preliminary stable isotope analysis of dog remains from burial and midden contexts in Woodland components at the Black Earth site

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Introduction

Dogs play a variety of roles in everyday human life, both today and in the ancient past. The archaeological record provides ample evidence of the importance of dogs to humans around the world for many thousands of years where they served as hunters, guardians, human companions as well as sources of meat and ritual offerings (Schwartz 1997; Lapham 2010).

Archaeologists excavating at the Black Earth site, a prehistoric Native American settlement in southern Illinois, found the skeletal remains of domestic dogs (*Canis familiaris*) in two very different contexts. Some of these animals were intentionally buried in graves upon death by their human companions, which suggests these dogs held a special status in life. Archaeologist also found isolated skeletal remains of dogs in refuse middens along with other trash from meals and daily activities.

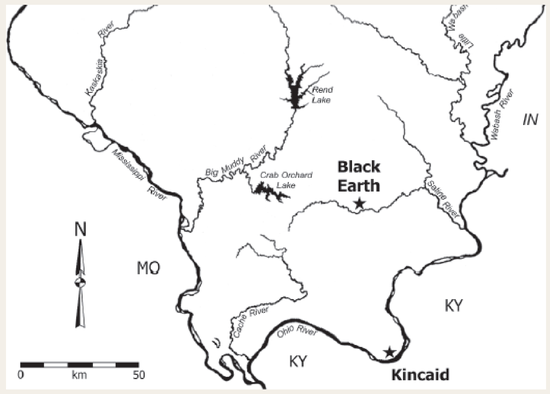

Figure 2: Location of the Black Earth site from Lapham (2010).

In other parts of the world, dogs held different statuses based on their intended role or use in human society, and these differences sometimes resulted in dogs being fed different types of diets (C.D. White et. al. 2001). This study explores whether or not differences existed in the diets of dogs buried at death versus those found in refuse midden deposits at the Black Earth site.

The Black Earth site is located along the Saline River in Saline County, Illinois. This study focuses on the Middle Woodland period occupation of the site, which occurred between 2100-1500 years before present (Jeffereies 1982). The people who lived here during this time were beginning to domesticate plants to supplement a diet previously based on animals and plants that were hunted and gathered.

Figure 1: Reconstruction of Late Woodland life at the Black Earth site as depicted by Thomas W. Gatlin. From Jefferies (1987).

Objectives & Hypothesis

This project examines the relationship between domestic dogs and the human inhabitants at the Black Earth site by studying dog diet using stable isotopes extracted from dog bones. Stable isotope analysis works on the assumption that you are what you eat. What these dogs were eating during their lifetime can be measured because specific food resources have distinct carbon (12C/13C) and nitrogen (15N/14N) ratios which are incorporated into body tissues, such as bone, of the animals consuming them. These specific isotope compositions can then be retraced to the plants and animals from which they came (Norr1993).

Based on the two different contexts of dog remains, we hypothesize that dogs buried in graves at death will show different stable isotope values than the isolated skeletal remains found in refuse midden contexts. If this hypothesis is supported by the data, it would suggest that different dogs were used in different ways by the people who lived at the Black Earth site thousands of years ago.

Methods

Archaeologists identified four dog burials during the excavations of the Black Earth site as associated with the Woodland period (1000-3000 years ago) (Jefferies 1982). In addition, our study identified two other dog burials in the collection.

To test the above hypothesis, we selected for stable isotope analysis six skeletal samples of dogs found in burial contexts and six samples of dogs from refuse midden deposits at the Black Earth site. These samples were sent to Dr. Peter Sauer (Department of Geological Sciences, Indiana University Bloomington) for preparation and analysis.

Figure 3: Feature 198 dog burial from the Black Earth Site. From Lapham (2010).

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Results

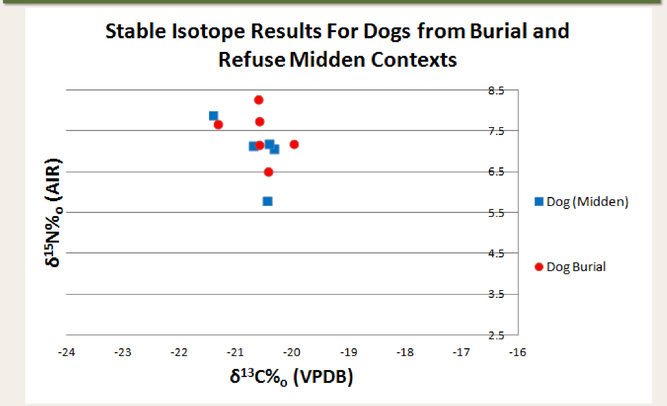

Figure 4: Stable Isotope Results from Burial and Refuse Midden Contexts.

This graph plots the carbon and nitrogen isotope data for the dog samples from burial (red circles) and refuse midden (blue squares) contexts. For comparative purposes, carbon and nitrogen ratios are converted to international standard ratios (δ^{13}C‰ VPDB and δ^{15}N‰ AIR) (Tykot 2010). Terrestrial animals that consume wild plants and legumes typically have carbon values between -28 and -20 δ^{13}C‰. Animals that eat other terrestrial animals generally have nitrogen values between 3 and 9 δ^{15}N‰ (Tykot 2010).

The carbon and nitrogen isotope data from the dogs at the Black Earth site fall within these two ranges, indicating that these dogs consumed a diet comprised largely of meat from herbivores that ate mainly wild plants. The dogs would have acquired their food from several sources. They would have been fed scraps by the human inhabitants of the site and they would have scavenged food from village trash dumps and hunted small terrestrial animals (including small rodents, squirrels, and rabbits).

Conclusions

Our hypothesis for the dogs of the Black Earth site is unsupported. As Figure 4 illustrates, there are no clear differences between the diet of dogs from burial and refuse midden contexts. One reason for this lack of dietary variation could be that dogs from this site were eating or being fed the same food sources despite the possibility that they may have been used for different purposes. It is also possible that the isolated dog remains found in refuse midden contexts were once interred in graves, but that over time these graves were disturbed and the skeletal remains scattered through refuse middens.

The archaeological evidence suggests that an important relationship existed between the human inhabitants of the Black Earth site and the dogs they buried based on the time and attention given to these dogs upon their death. How these dogs gained status as companion animals, hunters, guardians, ritual offerings, food sources, or some combination of the above needs further research. Future studies might use strontium or oxygen stable isotopes and ancient DNA to examine similarities and differences in the heritage of the dog population.

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