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How has the domestication of dogs impacted native North American culture and way of life?

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Introduction

Dogs have long been an integral part of the lives of people all around the world. The ancient breeds like the ones from Egypt, and the mongrel mixes that were useful for hunting and companionship remained basically the same in appearance until the Victorian era. This was when many men and women became dog breeders, a hobby which brought the advent of toy and other breeds (aside from companionship and show), along with the clarification of what stipulated emerging breeds. My German Shepherd can be traced back to only German Shepherds for generations, but the breed itself has only been in existence since the eighteenth to nineteenth centuries (see fig. 1). The dogs native to the Americas have all but disappeared in the last hundred years, but there was a certain influence on the native people who lived and worked with them. Native American dog breeds (living and extinct) all derive from the wolf-like ancestors from Eurasia. Native Americans brought dogs with them over the Bering Strait, or by boat along the continental coast (the most-accepted hypotheses for both human and dog arrival to date). Evidence suggests that the Native American dogs came with their humans on their Pleistocene migration because they have Euro-Asian wolf (of an extinct variety) ancestry, not American wolf traits found in their genes (Schwartz 1997; Leonard, et al. 2002). Through the overview of American dog genetics, morphology, archaeology, oral history, and other methods, the true meaning of man's best friend in the Americas pre-contact will be given

Fig. 1 shows a common type of picture on most people's phones or in their wallets; my dog at eight months.

some light.

The question I am attempting to answer is "how has the domestication of dogs impacted native North American culture and way of life?" I argue that dogs, as the only domestic animal in much of North America (aside from turkeys), were an integral part of the life and culture of the people who migrated to the Americas from Eurasia.

My argument is that dogs were integrated into the lives of native North Americans for myriad reasons, including the use of their fur, protection, hunting and pulling, companionship, and food. To support this argument, I synthesized information from a variety of sources, including biological analyses, archaeology, zooarchaeology, oral history, mythology, and historical documentation. The following categories are broken down in this way to introduce each important line of evidence, as well as express the wide spectrum of evidence that can be used in researching the question "what was the domestication of dogs on the native people of North America?"

This research paper is unique and important as an honors project because it goes beyond trying to find an answer to a question. This project, while it may not be what I do for the rest of my life, was an important stepping stone in helping me decide what I ultimately wish to study in graduate school and beyond. I learned to interpret readings from zooarchaeological reports, as well as papers concerning genomic and skeletal data. These are skills specifically important for answering countless research questions in my fields of interest (anthropology, geology). I strongly believe my work as an undergraduate will help immensely in what I ultimately choose to do later in life. My rationale for the project is that I firmly believe that the natural curiosity people have for the lives of other people is very often satisfied by the work done by anthropologists.

Background/History of Dogs

Domestic dogs have been in existence for thousands of years. Most evidence points to Eurasian human groups choosing wolf puppies for particular behaviors like tameness and attachment to people (Schwartz 1997). Sharing food and shelter was attractive to these early dog-like companions to people and they, in turn, protected their "pack" as if humans were one of their own. Some traits were specifically picked, such as tameness and, as what often happens in breeding, other traits that are somehow connected genetically also appeared, such as softer fur, floppy ears, and wagging tails (See fig. 2). This has even occurred in the domestication of foxes for the fur industry in Russia in the past few decades (Ratliff 2011). Dogs and people share an uncommon tie with one another, a symbiosis that even other animals like cats often do not share with us.

The morphological changes that go with a wolf-like ancestor becoming a dog over thousands of years is evidenced in research of mitochondrial DNA from wolves across the world that are used to test the origin of dogs. It is still unknown as to whether all dogs originated from one wolf population, or several, but it has become clear that most, if all, domestic dogs share an origin in Eurasia, from European grey wolves. Vila al. (1997) used genetic sampling of dog populations throughout the world, from Australia and Africa to the Americas, to show that many dog haplotypes group around different lineages of wolves. The exact distinction between wolves and domesticated dog has yet to be

Fig. 2 shows a Shiba Inu, a modern domestic dog with genetic ties to ancient extinct Native American "breeds". Image is from Barsh et al. 2006.

discovered.

Another hypothesis is that many old world dog lineages came with early humans across the Bering Strait, and that these dogs did not tend to interbreed with European dogs after contact. DNA analyses of extractions from over thirty dog specimens found in Central and South America were made, as well as from several hundred wolves and modern dogs worldwide. It was found that the New World dogs shared more genetic similarity to Old World grey wolves, especially because the samples were from areas where there were few (if any) wolves (Leonard, et al. 2002). This makes it likely that even ancient New World breeds were derived from the same ancestors as that of Old World wolves.

In addition to genetic analyses, measurements and morphology of skeletal remains of ancient dogs found at Native American sites can be used to understand past breeds. West and Jarvis (2012) studied dog skeletons found on the Alaskan coast to determine whether there were two breeds or two sexes of one population on the Kodiak Archipelago. The layer of this site was dated to be about two thousand years old. They compared the skeletal and skull morphologies to help in this determination. This helped them determine that there may have been a morphological difference between the sexes, which is an example of sexual dimorphism, not two distinct breeds. They used standardized measuring systems to determine canine breeds and species. The same methods were used in the speculation that the gracile canids were female

Fig. 3 shows the means and standard deviations for the cranial measurements, showing sexual dimorphism (size difference between males and females. Image is from West and Jarvis 2012.

Measurement	Male		Female		*t*-test
	Mean	SD	Mean	SD	
1. Total cranial length	180.03	10.05	153.59	5.66	$t = 10.24$, $p < 0.01$
13. Palatal length	89.17	5.02	77.27	2.63	$t = 8.78$, $p < 0.01$
23. Greatest mastoid breadth	66.02	3.21	56.01	2.67	$t = 12.65$, $p < 0.01$
29. Cranial breadth	55.61	2.49	54.52	1.55	$t = 1.37$, $p = 0.18$
31. Minimum frontal breadth	38.70	2.35	35.89	2.09	$t = 3.53$, $p < 0.01$
32. Frontal breadth	52.93	4.21	43.86	2.38	$t = 9.55$, $p < 0.01$

and the robust were male (See fig. 3). The main bones used were the cranium and the mandible. West and Jarvis (2012) concluded that if there was sexual dimorphism in this one breed of dog, the features would accommodate this, which they appear to do. These dogs were likely an extinct, but truly American variety, descended from those the ancestors of the Native Americans brought with them to this continent. The limitations of this research is that it shows only a small percentage of the archaeological and biological record. It is only one study in a small location, so it could be improved by being repeated in other locations around the continent. The strength of the study is in the clear and simple measuring system used to test the sexually dimorphic differences.

Arguments for Why Dogs are Important

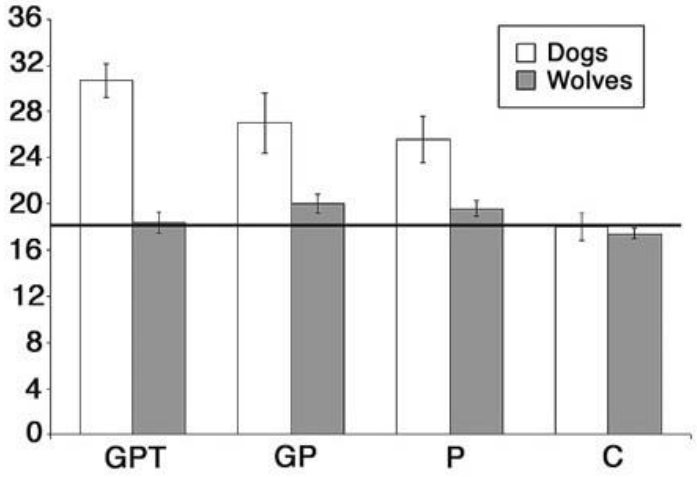
Lynn Snyder and Jennifer Leonard discuss the domestication of dogs throughout North America using archaeological methods. Archaeologists are trying to uncover the "breeds" that may have existed, as well as what the dogs were used for, depending on location and time period. Snyder and Leonard (2011) describe early intentional dog burials in Illinois, the eating of dogs in the American Southwest and Mexico, and how dogs became superfluous for activities such as pulling travois upon the introduction of horses in the sixteenth century. The examples that follow show the importance of companionship, food, hunting and transportation, as well as cultural uses like ceremonies and weaving, which support the argument that dogs were instrumental in shaping Native American societies.

Symbiosis and Companionship

The symbiosis between dogs and people is in a unique category. The level of social understanding and cooperation between the two species is rarely found elsewhere. Hare and his associates (2002) show, through experimentation, the level of cognition of domesticated dogs in

comparison to chimpanzees and wolves. Their point is to figure out if there is a correlation between the domestication process and recognition of human social cues. Methods include direct comparisons between the species of domestic dogs and chimpanzees and domestic dogs and wolves, with a control in each experiment. The three hypotheses tested include human exposure (dogs, particularly not puppies), similar social interactions (wolves), and changes in the selection pressure (dogs, including puppies). Hare discovered that dogs overall understood the social cues much better than chimpanzees and somewhat better than wolves (see fig. 4). This leads to the conclusion that during the domestication process, dogs who could understand human social cues did better, and were more often selected for (Hare et al. 2002).

Fig. 4 shows the difference in social cue comprehension between domestic dogs (white) and wolves (grey). Image is from Hare et al. 2002.



Riedel and her colleagues present material that digs further into the hypotheses presented by Hare (2002), and are specifically curious about whether it was the domestication process or the interaction with humans at a young age (early human raising) that determines how well domestic dogs understand human social cues. There were three experiments used in order to help test the hypotheses. The first tested four different puppy age groups on how they respond to three different social cues. Cups of hidden food were placed near the person. The results showed that puppies of all ages are able to pick up on human social cues and that it is likely not learned through ontogeny. In the second experiment, the cups were placed near the puppy (trace understanding of "pointing"). This experiment suggests puppies are more attuned to humans

than were older dogs. The third trial had the whole arm pointing (See fig. 5). All these trials have shown that it is likely that dogs' understanding of human social cues are innate skills (according to Riedel and her colleagues). Wolves do not share this trait, which means there is more than physical appearance in the separation of dogs and wolves, and this has to do with complex social behavior even our closest living relatives (chimpanzees) do not share with us (Riedel et al. 2008). This makes it evident that dogs have been specifically chosen by our ancestors to be part of the human pack, and to help protect us and be our friends. Traits such as loyalty and understanding of social and visual cues are widely used by people and their dogs, not the majority of other animals (Serpell 1995). No other creature is as attuned to our symbiotic relationship as that of dogs.

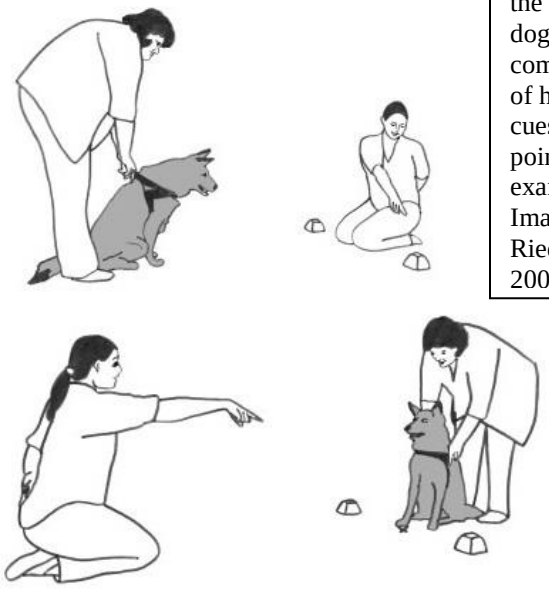


Fig. 5 shows the experiment dog comprehension of human social cues in the pointing example. Image is from Riedel et al. 2008.

Humans love to make representations of things that are special to them, and always have. Painting and figurines of dogs and other animals significant to early humans are found around the world. Darcy (2006) delves into the question of the depth of the relationship between dogs and people; why people bury their dogs, and the symbolism behind it. Morey also mentions how often dogs appear in ancient art with people, another symbolic use. And, aside from mummified cats in Egypt, dogs are the only known "pets" to have this treatment in the ancient world. Morey used methods such as finding dog burials all over the world and carefully examining them for signs of healed wounds and old age. Often, people are found buried nearby their dogs. In certain areas, such as the Koster site in Illinois, the dogs are often buried carefully, in a particular

arrangement. "Evidence from the Koster site hints that an affectionate relationship between humans and dogs may have existed more than 8,000 years ago in the North American Midwest (Morey 2006: 159). A question for future research is why archaic hunter-gatherers in North America had more dog burials than succeeding Native Americans.

Food

Another form of evidence about past dog use comes from the various historical sources (often primary) found in the diaries of English, French, and Spanish explorers from a few centuries ago, as well as interviews of people who lived among native tribes with native dogs as recently as about seventy years ago. It is well known to those with interest in American history that Meriwether Lewis and William Clark kept diaries of their early nineteenth century voyage (on foot and by boat) from the then current American states, through the interior of the continent, and eventually to the Pacific Ocean. They encountered many Native Americans along the way, and shared part of their journey with many people other than Sacajawea. In a journal entry, dated September 1804, by William Clark, there are direct descriptions of cooking and eating dog meat at a festival given by the native tribe of the northwestern continental US, the Teton Sioux (Clark, edited by Gary E. Moulton, 1983-2001). This appeared to have been a normal occurrence for many of the tribes Lewis and Clark encountered, and very often the men on the expedition took part in the native traditions, as it often helped to solidify their relationship. There does not appear to be Western bias implanted in this journal entry, but more of an observation and interaction with the people and their practice.

Meriwether Lewis also described events of the expedition, a couple of years later. Some quotations from the documents that follow clearly express the difference between his own dog and the ones they observed. Lewis kept a large black Newfoundland named Seaman with him on

the voyage. He appears to have seen Native American dogs, but never drew them, only describing them as,

> …unusually small, about the size of an ordinary cur; he is usually parti-coloured, amongst which, the black, white, brown, and brindle are the colours most predominant; the head is long, the nose pointed, the eyes small, the ears erect and pointed like that of the wolf; the hair is short and smooth, excepting on the tail, where it is long and straight, like that of the ordinary cur-dog. (Lewis's original journal for 16 February 1806)

The second entry has to do with eating dogs provided by Native Americans in April of 1806 (Lewis, edited by Gary E. Moulton, 1983-2001).

In 1937, anthropologist Ruth Moon interviewed a man named Thomas Edgar Cooley, who lived among the Kickapoo tribe of Oklahoma. The interviews include significant descriptions of the relationship these Midwestern Native Americans had with their dogs before major changes would modernize their world. He mentions many people by name and several practices, which include killing and eating dogs ceremonially. He also goes into how he participated in many of the other local practices like attending the burying of their dead. He describes how the younger generations would try modern activities but were mocked by the older tribal members until they reverted to their old ways (Cooley, interview by Ruth Moon. 29 July 1937). These collections of oral histories are significant because they show sources of evidence that are useful in the historical field, as they are primary literature, and give a different perspective from that of methods described in scientific processes. It is important to include these to help round out the question of the importance of dogs to the native people of the Americas.

Hunting and Transportation

> And every cur of them [Sioux dogs], who is large enough, and not too cunning to be enslaved, is encumbered with a car or sled (or whatever it may be better called), on which he patiently drags his load--a part of the household goods and furniture of the lodge to which he belongs. Two pole, about fifteen feet long, are placed on the dog's

> shoulder, in the same manner as the lodge poles are attached to horses, leaving the larger ends to drag upon the ground behind him; on which is placed a bundle or wallet which is allotted to him to carry, and which he trots off amid the throng of dogs and squaws; faithfully and cheerfully dragging behind him his load 'till night, and occasionally loitering by the way. (George Catlin, *Letter and Notes of the Manners and Customs of the North American Indians*, 1833; cited in Schwartz 1997:29)

This entry from George Catlin's notes depicts the typical usage of Plains Indian dogs pulling what was known as a travois. A travois is a pulling device used for dogs, and was likely adapted from the technologies French fur traders used on their own horses. Pulling was also important in other Native American cultures, one well-known example being the pulling of sleds of dogs from the far northern reaches of the continent. Other northern tribes used their dogs to hunt seals and musk ox. Those who herded caribou kept some dogs for herding rather than hunting. Tribes all around the continent kept dogs for hunting, herding, and pulling (Schwartz 1997). As the only domesticated large mammal, dogs were the only species available for such work. They could be easily bred for these different purposes, and remained useful in these methods until the emergence of Spanish horses in the west.

Ceremony/Religion/Ritual

Valadez et al. (2006) discuss the interaction between people and their dogs in the Americas. In the 1990s, Manzanilla conducted archaeological research on the "dog" skeletons found at the ancient Mexican city of Teotihuacan. His interest was of whether they were dog, wolf, or some hybrid of the two. This is because the specimens match the characteristics of wolves, but are generally smaller. There were both domestic dogs and Mexican wolves at the time, and these specimens appeared to be somewhat between the two.

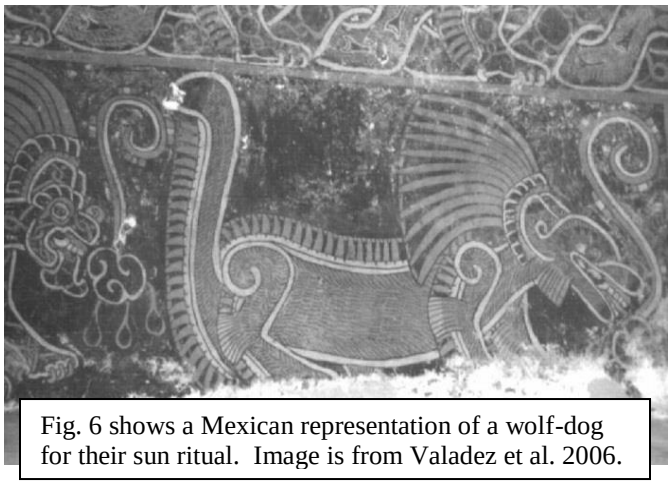


Fig. 6 shows a Mexican representation of a wolf-dog for their sun ritual. Image is from Valadez et al. 2006.

Evidence for symbolic usage including the ceremonial "sun passage" could be speculated with the cut marks and burned bones. It is likely the hybrids may have been pets, but then dismembered for the ceremonies, which follows an ancient Mexican tradition of the significance of the wolf to the sun (Valadez et al. 2006; see fig. 6). While eating a dog that may or may not have been once a companion may seem heart-wrenching from our perspective today, it is important not to project our cultural values on the past.

People around the world have creation myths and legends that stem from the natural world. Dogs are no exception, and neither are the origin stories of many of the Native North American tribes. The passage that follows is a translation of a typical creation story of both people and their dogs.

> At a remote time in the past, the earth was inhabited by people other than those created by the sun-god. They were very bad and fought among themselves all the time. When the sun-god saw this he decided to annihilate these people and to create another population in their stead. To destroy the bad people, the sun-god sent torrential and continuous rain, the springs opened, and the ocean overflowed. In the deluge all mankind was swept away…. Then the sun-god decided to create new people. First he made a man, then a woman, and finally a dog to keep them company. (Folk Literature of the Tehuelche Indians; cited in Schwartz 1997:1-2)

Other legends tell of a divine figure ridding the world of unworthy or bad people, and replacing them with new ones. One Cheyenne story tells of people using wolves they tamed to carry their loads of buffalo meat and protect the camp, while a Shawnee tale describes their creator having a dog. The Penobscot of Maine have a legend of all other animals being cursed by a character called Deceiving Man to live in fear of people, because they did not choose to ally themselves with humans like dogs did (Schwartz 1997:19-21). These oral stories and native legends demonstrate that the dog was important enough in these cultures to be represented in their origin stories, which Schwartz implies was seen as an honor.

Weaving

Lewis and Clark were not the first European or American explorers to describe their interactions with the natives, including their activities and animals. In 1792, Captain George Vancouver gave a report of a dog belonging to tribes in the western coasts of Washington State and British Columbia, known as the Salish woolly dog, which is no longer in existence (Barsh et al. 2006). His depictions express the dogs as having the appearance of large Pomeranians, fluffy, light-colored, with upright ears (see fig. 7). Other English and Spanish explorers observed similar dogs (Barsh et al. 2006).

The Salish woolly dog is an example of a truly American native dog. The woolly dog was used for its long fur in weaving, as well as companionship, and disappeared around the time of European colonization. Wayne Suttles and his colleagues used methods such as interviewing some of the native people in the 1940s, which led them to discover the existence of two separate breeds, one for hunting and one for weaving. The breeds were kept separate and treated differently. The hunting dog was less of a companion or pet than the woolly dog. Archaeologist Susan Crockford compared skeletons and found a distinct size difference that could be associated with the two breeds. The conclusion is there was likely no one Salish woolly dog breed, and that these dogs could have been related to any woolly Indian dog (Crockford 1998).

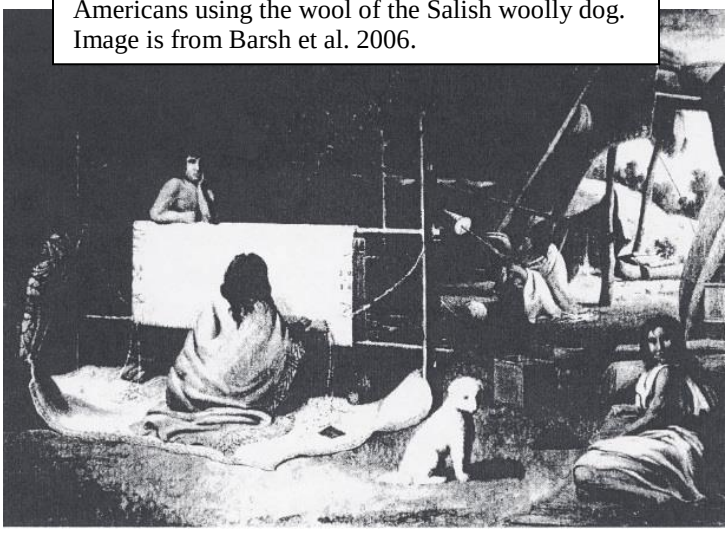


Fig. 7 is a mid-1800s historical depiction of Native Americans using the wool of the Salish woolly dog. Image is from Barsh et al. 2006.

Susan Crockford investigates the statistics and classifications of different dog bones

found from the Salish Indian dogs. Her work is divided by type of bone, such as crania, mandible, forelimb, hindlimb, and vertebrae (Crockford 1997). Crockford and Cameron Pye (1997) have collaborated their skills in paleoarchaeology and painting in order to bring two breeds of Northwest American dogs that died out in the last two centuries "to life." Using computerized methods similar to those used in England to reconstruct Viking artifacts (scanning and modeling systems), coupled with ethnographic data collected over three hundred years, Crockford and Pye have attempted to show what the smaller and larger dogs looked like. The smaller, fluffier dog provided fur (or wool) that was likely used for weaving, and looked a lot like the modern Finnish spitz. The larger was likely found throughout the Americas, and was used for more hunting and pulling activities. Pye includes sketches based on the reconstructions, and this has helped many anthropologists interested in the evolution of dogs to understand the variety of uses dogs can have, even in a small region (Crockford and Pye 1997; see fig. 8).

Fig. 8 is Pye's artistic reconstructions of the hunting dog (left) and woolly dog (right) based on the morphologies studied by Crockford. Image is from Barsh et al. 2006.

Discussion/Conclusion

These key lines of evidence, from hunting with dogs to burying them, to using their fur for weaving, show the evident symbiosis of the relationship Native North Americans have had with their dogs for millennia. The impact the domestication of this species in particular (as opposed to the few others, e.g. the turkey) is beyond using the animal for food. In fact, much like sheep and cattle in other regions, food is only one of many important uses of the North

American dog. Humans are naturally closer in behavior and level of social interaction with other mammals, particularly dogs and cats, even though they are not our closest living relatives. Evidence from modern studies of dog-human interaction and understanding of social cues shows that (in these experiments) dogs understand human social cues more consistently than the great apes, or their own closest relative, grey wolves.

The domestication of dogs in North America has played a significant role in the various cultures and histories of these people. Without dogs, several origin stories would not exist, and many defining practices (weaving, dog-sled-pulling, eating of dogs) would have to have been practiced with something else. Dogs and people were tied by a push and pull of survival and adaptation to their environment and to each other. Learning to co-exist and reap the mutual benefits changed the very cultures of Native American tribes across the continent.

The domestication of dogs has existed for about fifteen thousand years, and in the Americas, since the time the ancestors of Native Americans crossed to these continents. Dogs are the only domesticated animals in North America (aside from the turkey). Dogs have been useful in different ways for humans in the Americas than in Eurasia, where dogs originated (See fig. 9) As the migration of people fanned out across the continents, dogs became useful, not only as hunters and protectors, but as bearers of wool for weaving, pullers of travois and sleds, and as food. The lack of creatures like cows and sheep available for domestication

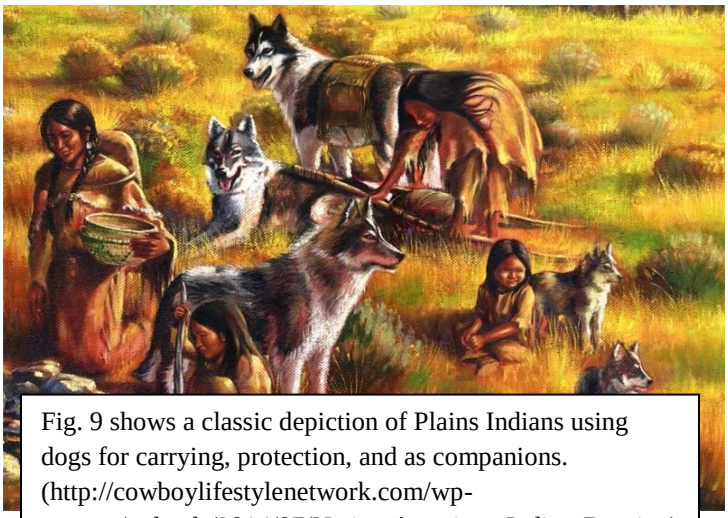


Fig. 9 shows a classic depiction of Plains Indians using dogs for carrying, protection, and as companions. (http://cowboylifestylenetwork.com/wp-content/uploads/2014/07/Native-American-Indian-Dog.jpg)

meant dogs were not used for herding, and fewer breeds would develop in America. After European contact, however, the admixture of European dogs with the native varieties helped bring about the demise of the true American dogs. Modern "American" breeds like the American Eskimo, Alaskan Husky, and the Malamute, are not just descendants of American dogs, but a result of this mixture. By the turn of the nineteenth to twentieth centuries, the American dogs so important to many Native tribes, were virtually extinct.

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Appendix: Annotated Bibliography

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Barsh and his co-authors' purpose in this chapter is to understand the appearance and significance of the Salish woolly dog (now extinct) on the western coasts of Washington State and British Columbia. The difficulty is distinguishing and not confusing the modern dogs now living in the Salish area. The woolly dog was used for its long fur in weaving and disappeared around the time of European colonization. Suttles' method included interviews of the native people in the 1940s, and discovered the existence of two separate breeds, one for hunting and one for weaving. The breeds were kept separate and treated differently. Other examples include the 1792 observations by Captain George Vancouver, who compared them to large Pomeranians. Other English and Spanish explorers observed similar dogs. Anthropologist Crockford compared skeletons and found a distinct size difference that could be associated with the two breeds. The conclusion is there was likely no one Salish woolly dog breed, and that it could have been related to any woolly Indian dog.

Brown, Sarah, Christyann M. Darwent, and Benjamin N. Sacks
2013 Ancient DNA Evidence for Genetic Continuity in Arctic Dogs. *Journal of Archaeological Science* 40:1279-1288.

Sarah Brown and her coauthors' purpose is to investigate the genetic profile of Arctic dogs, to see if their haplogroups are similar to the ancient groups brought by people thousands of years ago, and to see if modernization has had any influence. The authors' focus is the DNA characters found in indigenous dog populations throughout northern North America. Methods include sampling dog bones found during a multi-year archaeological survey of Inughuit houses in the Arctic Circle (twenty-one pre-contact surveys, four post, and three modern were in the sampling). These analyses revealed that most of the bones were of the A31 haplotype (dog), and three of the pre-contact were that of grey wolf. The modern dogs, such as malamutes, showed near replacement of haplotype. It appears haplotype A31 is likely only found in the Arctic.

Clark, William
1983-2011 *Journals of Lewis and Clark*, edited by Gary E. Moulton. 13 vols. University of Nebraska Press, Lincoln.

In this journal entry by William Clark, there are direct descriptions of cooking and eating dog meat at a festival given by the Teton Sioux, in September 1804. This appeared to have been a normal occurrence for many of the tribes Lewis and Clark encountered, and very often the men

on the expedition took part in the native traditions, as it often helped to solidify their relationship. There does not appear to be Western bias implanted in this journal entry, but more of an observation and interaction with the people and their practice.

Cooley, Thomas Edgar
1937 *Cooley, Thomas Edgar Interview*. Interview by Ruth Moon. 29 July 1937:307-313.

This interview, made by Ruth Moon in 1937, is from a man named Thomas Edgar Cooley, who lived among the Kickapoo tribe of Oklahoma. He mentions many people by name and several practices, which include killing and eating dogs ceremonially. He also goes into how he participated in many of the other local practices like attending the burying of their dead. He describes how the younger generations would try modern activities but were made fun of by the older tribal member until they reverted to their old ways.

Crockford, Susan J. and Cameron J. Pye
1997 Forensic Reconstruction of Prehistoric Dogs From the Northwest Coast. *Canadian Journal of Archaeology* 21(2):149-153.

Susan Crockford and Cameron Pye have collaborated their skills (the former as an archaeozoologist and the latter a paleoartist) in order to bring the extinct two breeds of Northwest American dogs "to life". Using computerized methods similar to those used in England to reconstruct Vikings (scanning and modeling systems), coupled with ethnographical data collected over three hundred years, Crockford and Pye have attempted to show what the smaller and larger dogs looked like. The smaller, fluffy dog was likely used for weaving, and looked a lot like the modern Finnish spitz. The larger was likely found throughout the Americas, and was used for more hunting and pulling activities. Pye includes sketches based on the reconstructions, and this has helped many anthropologists interested in the evolution of dogs understand the variety of uses dogs can have, even in a small region.

Crockford, Susan; contribution by Nobuo Shigehara, Satoru Onodera, and Moriharu Eto
1997 *Osteometry of Makah and Coast Salish Dogs*. Archaeology Press, Simon Fraser University, British Columbia.

This work by Susan Crockford covers the statistics and classifications of different dog bones found from the Salish Indian dogs. It is divided by type of bone, such as crania, mandible, forelimb, hindlimb, and vertebrae, with further division under each of these headings. The last two chapters have to do with the distribution and chronology of the types of dog found, and then the final discussion of the data and where research has brought Crockford up to this point.

Crockford, Susan, ed.
1998 *Dogs Through Time: An Archaeological Perspective*. Proceedings of the 1st ICAZ Symposium on the History of the Domestic Dog. Eighth Congress of the International Council for Archaeozoology (ICAZ98). August 23-29, 1998. Victoria, British Columbia.

This collection of archaeological reports range from articles on dog evolution and early uses of dogs, to what they were used for in different parts of the world, including North America, Rome and Belgium, and New Guinea. The focus on native American dogs is found within all the sections, so there will be information on the practical and ritual uses of American dogs, as well as non-European skeletal variations and DNA and archaeozoological analysis as well as these results. The final section is a discussion and inclusion of additional reference materials.

Hare, Brian, Michelle Brown, Christina Williamson, and Michael Tomasello
2002 The Domestication of Social Cognition in Dogs. *Science* 298(5598):1634-1636.

Hare and his associates are trying to understand the level of cognition of domesticated dogs in comparison to chimpanzees and wolves. This is to figure out if there is a correlation between the domestication process and recognition of human social cues. Methods include direct comparisons between the species of domestic dogs and chimpanzees and domestic dogs and wolves, with a control in each experiment. The three hypotheses to be tested include human exposure (dogs, particularly not puppies), similar social interactions (wolves), and changes in the selection pressure (dogs, including puppies). Hare discovered that dogs overall understood the social cues much better than chimpanzees and somewhat better than wolves. This leads to the conclusion that during the domestication process, dogs who could understand human social cues did better, and were more often selected for.

Leonard, Jennifer A., Robert K. Wayne, Jane Wheeler, Raul Valadez, Sonia Guillen, and Carlos Vila
2002 Ancient DNA Evidence for Old World Origin of New World Dogs. *Science* 298(5598):1613-1616.

Leonard and her associates propose that many old world dog lineages came with early humans across the Bering Strait, and that these dogs did not tend to interbreed with European dogs after contact. Were the dogs from grey wolves from the Old World, or New World strains? Methods include DNA analyses of extractions made from over thirty dog specimens found in Central and South America, as well as several hundred wolf and modern dog worldwide. It was found that the New World dogs shared more genetic similarity to Old World grey wolves, especially because the samples were from areas where there were little to no wolves. This makes it likely that even ancient New World breeds were derived from Old World wolves.

Lewis, Meriwether
1983-2001 *Journals of Lewis and Clark: Lewis's original journal for 16 February 1806*, edited by Gary E. Moulton. 13 vols. University of Nebraska Press, Lincoln.

It is well known that Meriwether Lewis kept a large black Newfoundland named Seaman with him on his and Clark's voyage. He appears to have seen Native American dogs, but never drew them, only describing them as, "unusually small, about the size of an ordinary cur; he is usually parti-coloured, amongst which, the black, white, brown, and brindle are the colours most predominant; the head is long, the nose pointed, the eyes small, the ears erect and pointed like that of the wolf; the hair is short and smooth, excepting on the tail, where it is long and straight, like that of the ordinary cur-dog." The second entry has to do with eating dogs provided by Native Americans. April, 1806.

Morey, Darcy F.
2006 Burying Key Evidence: The Social Bond Between Dogs and People. *Journal of Archaeological Science* 33(2):158-175.

Darcy Morey delves into the question of the depth of the relationship between dogs and people; why people bury their dogs, and the symbolism behind it. It is also mentioned how often dogs appear in ancient art with people, another symbolic use. And, aside from mummified cats in Egypt, dogs are the only known "pets" to have this treatment in the ancient world. Methods are finding the large amounts of burials all over the world and carefully examining them for signs of healed wounds and old age (example found in Tennessee). Often, people are found buried nearby their dogs. In certain areas, the dogs are often buried carefully, in a particular arrangement. A question for future research is why archaic hunter-gatherers in North America had more dog burials than succeeding Native Americans. There may be many more unanswerable questions.

Ratliff, Evan
2011 Animal Domestication, Taming the Wild, National Geographic Online http://ngm.nationalgeographic.com/2011/03/taming-wild-animals/ratliff-text/1, accessed March 15, 2015.

This national geographic article goes into the taming of foxes in Russia (mostly for the fur trade), and how this has been influential in the understanding of the history and genetic process of other important domestications, like dogs. The breeders of the foxes selectively bred for softer fur, which apparently is genetically linked to other traits, such as gentleness in behavior. Behavior was also selected for, and things like floppy ears would emerge. It is important to understand how traits and phenotypes are closely and complexly linked in the genes of the animals and plants people domesticate.

Rick, Torben C., Phillip L. Walker, Lauren M. Willis, Anna C. Noah, Jon M. Erlandson, Rene L. Vellanoweth, Todd J. Braje, and Douglass J. Kennett
2008 Dogs, Humans, and Island Ecosystems: The Distribution, Antiquity and Ecology of Domestic Dogs (*Canis familiaris*) on California's Channel Islands, USA. *The Holocene* 18(7):1077-1087.

Rick and his co-authors' focus is upon the significance of humans bringing dogs with them to the Channel Islands, thus influencing the natural ecology of the islands. Data is collectible from this time because dogs mostly no longer live on these islands. In other parts of the world, human introduction of dogs and other animals have had detrimental effects on the ecosystems of those islands. Their methods included reviewing both published and unpublished data, mostly based upon the remains of dogs in the Santa Barbara Museum of Natural History and the Fowler Museum at UCLA. These specimens were dated as best as possible and correlated with foods they ate and where they were found on the islands. These included at least forty-two sites. It is still not certain what they were used for.

Riedel, Julia, Katrin Schumann, Juliane Kaminski, Josep Call, and Michael Tomasello
2008 The Early Ontogeny of Human-Dog Communication. *Animal Behavior* 75(3):1003-1014.

Riedel and her colleagues are taking off on the hypotheses presented by Hare (2002), and are specifically curious about whether it was the domestication process or the interaction with humans at a young age (early human raising) that determines how well domestic dogs understand human social cues. There are three experiments used in order to help test the hypotheses. They first tested four different puppy age groups on how they respond to three different social cues. The cups of hidden food were placed near the person. The results showed that puppies of all ages are able to pick up on human social cues and that it is likely not learned through ontogeny. In the second, the cups were placed near the puppy (trace understanding of "pointing"). This experiment suggests puppies are more attuned to humans than older dogs. The third trial had the whole arm pointing. All these trials have shown that it is likely that dogs' understanding of human social cues are skills known before being taught by people.

Schwartz, Marion
1997 *A history of dogs in the early Americas*. Yale University Press, New Haven, Connecticut.

Marion Schwartz covers a comprehensive outline of the importance and use of dogs in the Americas before the modern times. Even though she counts herself as a cat person, Schwartz expresses the significance of dogs in these continents (well, cats were not an option). She looks into the origin of American dogs, their active uses, sometimes being part of the Native American diet, the spirituality of dogs, and the significance of dogs in artwork from the Americas. Schwartz includes quotations from famous dog stories in literature, coupled with pictures to fully appreciate the aspects like artwork as well as archaeological graphs.

Serpell, James, ed.
1995 *The Domestic Dog: Its Evolution, Behaviour and Interactions with People.* Cambridge University Press, Cambridge, United Kingdom.

Serpell, as the editor, has divided this source into three major sections, domestication and evolution, behavior and behavior problems, and human-dog interactions. Within the domestication and evolution section, the origins are discussed in two articles, which I will pull much of my data from. The behavior and behavior problems section has eight articles, which range from feeding and sociality, and differences between males and females, puppies, and the difference genetics makes. The section on human-dog interactions may be the most important for this research, as its six articles cover topics that have to do with the complexity of the relationship over millennia between dogs and their humans.

Snyder, Lynn M. and Jennifer A. Leonard
2011 The Diversity and Origin of American Dogs. In *The Subsistence Economies of Indigenous North American Societies: A Handbook,* edited by Bruce D. Smith, pp. 525-541. Smithsonian Institution Scholarly Press, Lanham, Maryland : Published in cooperation with Rowman & Littlefield Publishers.

Bruce Smith is the editor of a large book comprising of many articles concerning Native American subsistence, and chapter twenty-one is an article that specifically deals with the importance of domestic dogs. Lynn Snyder and Jennifer Leonard's purpose is to describe the current knowledge of the domestication of dogs throughout North America. They go into the earliest cave sites where remains have been found, what types there may have been, as well as what the dogs were used for, depending on location and time period. There are also descriptions of the earliest intentional dog burials in Illinois, eating dogs in the Southwest America and Mexico, and how dogs became superfluous upon the introduction of horses in the sixteenth century for activities such as pulling travois. Origin and other importance of dogs are mentioned throughout.

Valadez, Raul, Bernardo Rodriguez, Linda Manzanilla, and Samuel Tejeda
2006 History, Ethnography, and Archaeology of the Coast Salish Woolly-Dog. In *Dogs and People in Social, Working, Economic or Symbolic Interaction,* edited by Lynn M. Snyder and Elizabeth A. Moore, pp 1-11. Oxbow Books, Oxford, United Kingdom.

Valadez and his co-authors add another interesting chapter to Snyder and Moore's collective works on the interaction between people and their dogs, again in the Americas. In the 1990s, Manzanilla conducted archaeological research on the "dog" skeletons found at the ancient Mexican city of Teotihuacan. The interest is of whether they were dog, wolf, or some hybrid of the two. This is because the specimens match the characteristics of wolves, but with smaller

dimensions. There were both domestic dogs and Mexican dogs at the time, and these specimens appeared to be somewhat between the two. Evidence for symbolic usage including the ceremonial "sun passage" could be speculated with the cut marks and burned bones. It is likely the hybrids may have been pets, but then dismembered for the ceremonies, which follows ancient Mexican tradition of the significance of the wolf to the sun.

Vila, Carles, Peter Savolainen, Jesus E. Maldonado, Isabel R. Amorim, John E. Rice, Rodney L. Honeycutt, Keith A. Crandall, Joakim Lundeberg, and Robert K. Wayne
1997 Multiple and Ancient Origins of the Domestic Dog. *Science* 276(5319):1687-1689.

In this article, Vila goes into how the mitochondrial DNA from wolves across the world are used to test the origin of dogs. It is still unknown as to whether all dogs are originated from one wolf population, or several, but it has become clear that most, if not all, domestic dogs share an origin in Eurasia, from European grey wolves, and not from American wolves. Methods include the genetic sampling of dog populations throughout the world, from Australia and Africa to the Americas. It is clear that the coyote diverged a million years ago from the wolf, but this does not clarify the ability for coydogs and coywolves to exist (although this is not significant information). It has been seen that many dog haplotypes group around different lineages of wolves. The exact distinction between wolves and domesticated dog has yet to be discovered.

West, C.F. and K. N. Jarvis
2012 Osteometric Variation in Domestic Dogs (*Canis familiaris*) from the Kodiak Archipelago, Alaska. *International Journal of Osteoarchaeology*. doi: 10.1002/oa.2293

West and Jarvis' purpose in this article is to re-examine dog skeletons found on the Alaskan coast and determine whether there were two breeds or two genders of one population on the Kodiak Archipelago. The authors' focus is looking at the skeletal and skull morphologies to help in this determination (they are hypothesizing the two genders theory). Methods included using standardized measuring systems used to determine canine breeds and species. The same methods were used in the speculation that the gracile canids were female and the robust were male. The main bones used were the cranium and the mandible. The results concluded that if there was sexual dimorphism in this one breed of dog, the features would accommodate this, which they appear to do.