

*Thyroxine's Role in the Pre-Domestication of the Dog from Wild Dogs and Wolves; a Unique Opportunity to Reexamine Man's and Dog's Migration to the Americas*

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**Abstract**

Recent work in the field of canid evolution has brought into question the matter of where, how and when the modern dog was domesticated. Now generally believed to be descended from the wolf (*Canis lupus*), some biologists point directly at the Asian wolf (*Canis lupus pallipes* and *Canis lupus arabs*). Until relatively recently the domesticated dog was thought to be the result of the cross breeding of various canids, including the wolf, the jackal (*Canis aureus*) and perhaps the coyote (*Canis latrans*). The possibility of any jackal ancestry subsequently ruled out it was classified as *Canis familiaris*. Given that the dog and the wolf are able to interbreed and produce viable fertile offspring, something not previously thought possible in higher mammals across species, the domesticated dog is currently considered a subspecies of the wolf being placed in the genus *lupus*, along with the wolf, and is now sometimes classified as *Canis lupus familiaris*. However, the DNA studied of ancient American dogs appears to show greater similarities with the Eurasian dog than with the north American wolf. After the examining of mitochondrial (mt) DNA of some 654 dogs from around the world, biologists hold that a commonality can be demonstrated between regional groups of dogs, implying a common parent or group of parents. The mtDNA varies little from dog to dog regardless of its location or breed, much as is the case with humans. Early Native Americans are thought to have brought dogs with them from Asia as the Aborigines of Australia likewise are believed to have imported the dingo (*Canis dingo*). Despite some opinion that dogs were domesticated independently in the Old World and in the New, most consider domestication to have happened only once, possibly around 15,000 years ago in Asia. I propose that dogs were pre-

domesticated either from wolves and/or wild dogs independently in different places and different times without human intervention and that subsequent hybridization of wolves and dogs in addition to cross breeding within a species both by, and without man, has occurred which completed the domestication process. I point further to the possible movement of man and dog between the Eurasian and American continents prior to, and during the exposure of the Bering land mass and after its last submergence.

## **Wild Canids**

Although it was thought that vertebrates capable of cross breeding and producing fertile offspring could only do so provided they were subspecies of a common species closely related species are able to hybridize (Crockford 2002) as with the example of the wolf and the coyote, the hybrids of which are gaining in number. In addition to the wolf, coyote and jackal, a number of species of wild dogs are still found in the wild (see table 1); the Australian dingo (*Canis dingo*), the Asian dhole (*Cuon (Canis) alpinus*), the African wild dog (*Lycaon pictus*) and the Carolina wild dog (currently *Canis lupus familiaris*). I. Lehr Brisbin, Jr. argues that the Carolina wild dog of south eastern United States, is so similar to the free roaming native Korean breed, chindo-kae, as to be indistinguishable from it (Handwerk 2003), and its external body phenotype closely resembles the dingo and other Australian feral dogs (Brisbin/Risch 1997). Brisbin proposes that the Carolina wild dog may have been brought to the Americas by Native Americans across the Bering Straits and further believes that the DNA samples taken from Carolina wild dogs may demonstrate that they are a more primitive form of dog than the domesticate, that their DNA places them at the base of the canine family tree (Handwerk 2003). Some researchers propose that the dingo, Carolina wild dog and the Asian dhole could represent the dog in its prehistoric and pre-domesticated form. Brisbin also noticed that the Carolina wild dog seasonally digs small pits in the ground about the size of their muzzles, which they subsequently place in the pits (Handwerk 2003). Though this curious phenomena has not yet been fully explained it is not a normal habit of domesticated dogs, even feral ones, showing some behavioural differences between the Carolina wild dogs and the domesticate. (I have, however, observed such behaviour from the Siberian husky.) The primitive wild dogs of the present day have characteristics indicative of a close descent of type if not a direct genetic

relationship to those first dogs to initiate the human-canine bond (Brisbin/Risch 1997). The information available about the early domesticating wolf-dogs shows a high degree of uniformity in the cranial and skeletal features and external phenotypes, as typified by the dingo. The external body morphotype shared by these canids, throughout the vast reaches of their dispersion, bears little resemblance to that of the wolf subspecies generally considered to have begun the domestication process in the Middle East (Brisbin/Risch 1997).

*Figure 1: Overview of most members of the canidae family currently found in the wild.  
Image Eckersley 2003*

<u>Genus</u>	<u>Species</u>	<u>Subspecies</u>	<u>Common Name</u>	<u>Location</u>
Canis	dingo	N/A	Dingo	Australia
Canis	latrans	N/A	Coyote	North America
Canis	lupus	arabs	Asian Wolf	Asia
Canis	lupus	arctos	Arctic Wolf	Northern Canada, Alaska, Northern Russia
Canis	lupus	baileyi	Mexican Wolf	Mexico, Southern U.S.A.
Canis	lupus	canestrus	Persian Wolf	Middle East
Canis	lupus	chanco	Chinese Wolf	Northern China
Canis	lupus	faruberis	Dog	Worldwide
Canis	lupus	lupus	Gray Wolf	Europe, Russia
Canis	lupus	lycaon	Gray Wolf	Eastern U.S.A.
Canis	lupus	occidentalis	Gray Wolf	Eastern U.S.A.
Canis	lupus	pallipes	Asian Wolf	Asia
Canis	rufus	N/A	Red Wolf	South Eastern U.S.A.
Canis	ssp.	N/A	Carolina Wild Dog	Southeastern U.S.A.
Cuon (Canis)	alpinus	N/A	Asiatic Dhole	Asia
Lyccon	pictus	N/A	African Wild Dog	Subsaharan Africa

## Morphology

The modern domesticated dog differs from the wolf both in its lack of a precaudal gland, a scent gland located on the upper side of the tail about three to four inches below the base, and in its breeding cycle; the wolf comes into estrus only once a year, generally in February, whelping in May (Mech 1981), where the dog is able to breed twice yearly. Additionally, the fore legs of the wolf are generally far closer to each other than is the case with the dog, such that the paw tracks of the hind legs fall directly in line with those of the fore legs where, in dogs, the tracks left by the fore legs are generally noticeably further apart. The paws of wolves are also considerably larger than those of any other dog with pug tracks measuring up to 6 inches square and are ideal for trekking across expanses of soft snow. The tails of dogs are sickle shaped when in a resting position, curving gently or tightly away from the hind quarters (including those of *C. dingo* which often carry their tails in a tight curl, similar to that of the husky), where the tails of wolves hang straight or in a slight curve toward the body at rest. With only few exceptions, such as the husky, the malamute and the Native American wool dog breeds, dogs have only one short-haired coat, where the wolf, husky, malamute and the wool dog have two, one of long course guard hairs, and the other of a soft downy undercoat; the latter being shed once to twice per year. Some dogs possessed of two coats bear a striking resemblance to the wolf and may even be indistinguishable to the novice eye at a distance not only in their general shape and movements, but also in the colouration and pattern of their pelage; a darker saddle over the shoulders and spine and lighter fur on the flanks and underside. Both the husky and the malamute share the facial mask with the wolf; the guard hairs immediately behind the cheeks of these breeds being long, stiff and inclined to the rear of the body with hairs on the neck immediately behind those, standing perpendicular to the neck, urging the longer facial hairs to stand relatively erect and away from the neck forming a distinctly round shape to the face. The markings of the facial hair is generally, similar with darker fur on the top of the head, often continuing down over the eyes and the upper portion of the muzzle, and lighter hair found covering the upper and lower mandibles. Individual wolves and huskies can differ considerably in colour, ranging from pure white to solid black. Most subspecies of the wolf are considerably larger than the husky, weighing from 80 lbs to as much as 120 lbs and standing between 25 and 30 inches at the withers with the Eurasian wolf being the smaller, with the husky weighing in around 52 lbs to

69 lbs and standing a mere 21 to 23 1/2 inches at the withers, much close the the overall dimensions of the European wolf (*Canis lupus lupus*). The malamute is somewhat larger than the husky and compares well to the size and weight of the eastern American grey wolf (*Canis lupus lycaon*). Most wild dogs and many domesticates, however, are ginger in colour with a single smooth coat (*Lycaon pictus* being an exception with a mottled or piebald colouration).

## **Domestication**

One of the most striking differences in wolf and dog behaviour is the extreme timidity of wolves in respect to humans. Even wolves raised with humans are timid of strangers. This fearful nature appears to diminish by successively introducing increasing amounts of dog genes into wolf populations (as was done by crossing poodles with captive bred wolves in the Bavarian Forest reserve, Germany (Zimen 1981), or by raising successive generations around humans. The first female wolf pup taken into and raised in Zimen's home eventually turned on him ultimately necessitating it's release (1981) demonstrating that domestication is not possible in the short confines of one generation. In fact, a 40 year experiment started by Dmitry K. Belyaev, a biologist at the Institute of Cytology and Genetics in Novosibirsk, Russia, and completed by Dr. Lyudmila Trut after his death, in which a black phase of the the silver fox (*Vulpus vulpus*) was domesticated exclusively for tameability, showed recently that "...after selecting from 45,000 foxes over 40 years the institute now had 100 fully tame foxes. Tameability has brought with it other changes, like floppy ears and white-tipped tails where pigment has been lost from the fur" (Wade: 2002). The changes in Belyaev's foxes bear out the speciation proposed by Crockford (2002) very well. The molting and oestrus timing of many of Belyaev's female foxes shifted to earlier in the season by several months until, as the experiment continued, molting and oestrus had receded so far that several females were experiencing two oestrus cycles per year and, after 20 generations, some were able to whelp twice annually. Additionally Belyaev's foxes started to develop curly tails (Crockford 2002a). Early moults, bi annual oestrus cycles and curly tails are normally found in the domesticate.

Whether dogs all descend from one group of wolves or not, the question of how they came to be domesticated in the first place is somewhat complex. Essentially there are four ways of approaching

a solution. It may have been man who domesticated the wolf or dog. It may have been the wolf or the dog which domesticated man. Thirdly, a combination of both elements may have brought about a mutually convenient symbiosis and finally, the dog may have domesticated itself. It is very probable that wolves noticed ancient man encroaching upon its territories. Ancient man must likewise have noticed wolves lurking timidly in the shadows near their campsites. Some of these wolves over time neared upon the settlements little by little hoping to take advantage of easy food. Clearly wolves were to benefit from the scraps left by man. The same must be true for man, who could have benefited in the same way from wolf kills. It is likely that individual wolves lacking a fear of humans more than the other members of their packs or those individuals cast out from wolf packs (referred to generally as "omega" wolves) in addition to individuals perhaps less able to hunt due to injury or other causative matters, were more likely to fall into this category out of their greater need. "It is apparent, therefore, that many of the behavioural and ecological traits of domesticated dogs are the result of environmental selection pressures or selective breeding choices made by the dogs themselves, rather than the result of artificial selection imposed on the dogs by their human consorts" (Brisbin/Risch 1997). A change in level of two forms of thyroid hormone in the blood,  $T^3$  and  $T^4$  referred to collectively as thyroxine, would result in a reduced fear in wild canids and enable them to better tolerate "anthropogenic", or human impacted, environments (Crockford (2002). It is the thyroid gland which regulates thyroid hormone, a hormone which exists in two major forms. Levothyroxine ( $T^4$ ), with four iodine atoms per molecule, is an inactive form that can be converted into  $T^3$  and is produced exclusively by the thyroid gland. Triiodothyronine ( $T^3$ ), with three iodine atoms per molecule, is eight times more effective than  $T^4$  and is converted from  $T^4$  in the thyroid, brain, liver, and bloodstream, and in various tissues of the body. Iodine (which is predominantly stored in the thyroid) is of vital importance to the production of thyroxine which, in turn, regulates the metabolic rate of an organism. Animals deprived of thyroxine and/or less able to produce or process thyroxine, experience a diminished flight response to stress. This would cause such individual animals to respond less fearfully to stress, including humans, than their litter mates, reducing their innate urge to flee. The offspring of such animals would suffer yet less fear of humans whether by exposure to them through their parents' habits, or by gradual hormonal changes such as their own usage of thyroxine; the more fearful returning to the wild, the less fearful approaching human settlements by ever increasing degrees, thereby isolating a hormonally different

group and bringing about speciation. These hormonal changes, and their subsequent influences on canid biology, explain many of the morphological differences between the wolf and the dog (Crockford 2002). The comparatively short distal limb bones (those of the arms and legs) of Neanderthal Man fossils compared to anatomically modern human remains, for example, coupled with their relatively large skull and disproportionately long trunk in relation to their bodies, demonstrates a hormonal change to the stress of a change in environment, that the amounts of thyroxine and iodine realized into the blood as a direct result of such stressors would bring about skeletal change (Crockford 2002) as is the case with dogs. Neanderthals were subjected to a life in Arctic tundra environments during the glacial period and needed to consume a diet consisting almost exclusively of raw animal flesh and were also likely to have ingested less iodine, therefore. Crockford demonstrates a similar skeletal pattern in the Inuit and Sami (Lapp) peoples who, like Neanderthals, find themselves in very hostile and frozen tundra having to resort, likewise, to an almost exclusively carnivorous diet. Only individuals processing less thyroxine, that is ingesting less iodine or those less able to produce  $T^4$  in the thyroid, or convert it to  $T^3$ , would have been able to tolerate such stressors. The stressors affecting Neanderthals, Inuit and Sami, would fully explain their independent morphological differences from the morphology of other groups of modern man, while the stressors affecting the dog, namely man, explain morphological change in the case of the dog and its differing morphology from the wolf. The group of genes which generates thyroid rhythm phenotypes is thought to provide the essential raw material for natural selection to act upon during speciation (Crockford 2002). This premiss when applied to the dog allows that it, like humans, was subject to a reduction in the amount of thyroxine processed allowing for similar stressors to bring about similar evolutionary change in independent groups of similar taxa (Crockford 2002). In the case of the dog one important stressor would be the fear of predation (by humans). This would inevitably have effected thyroxine and adrenaline released by the adrenal gland. Only individuals that presented with less fear of human contact would have been able to manage life in the new environment. This in turn would lead to groups of animals already somewhat different from their ancestral lineages (Crockford 2002). Hence, some form of pre- or proto-domestication, as Crockford puts it, must have occurred prior to direct contact with humans (2002). It is only sensible to assume that quickly such pre-domesticated dogs were taken in by man (particularly the pups which, as with most other taxa, are far quicker to accept the proximity of

humans than are the adults). These pets may have served either as company, working dogs or even livestock. It must have been only a matter of time before selective breeding, particularly for friendliness to man and for a decreased barking inhibition, came to alter the future of the dog permanently; the bark of the domestic dog is an example of juvenile behaviour which, in turn, is a typical affect of domestication. Hence wild dogs such as *C. dingo* may easily be viewed as examples of pre-domesticated dogs, dogs capable of nearing humans while still remaining wild.

The idea of wild wolves lurking around human settlements and eventually becoming integrated into tribal life is far fetched: The relationship to wolves of indigenous North Americans and other peoples living near wild wolves, appears to hold this out quite well; there appears to be little, if any, direct contact between the two predators. Presumably if a direct relationship were once to have existed between man and wolf in ancient times there would be no reason to suspect that such a relationship could not--or would not--be possible at the present. Native Americans view the wolf as their brother. The wolf (*Manitou*) plays a very important part in their creation beliefs. Their admiration (and that of many other peoples living in close proximity with wild wolves such as those of Uttar Pradesh, India) for the prowess and wisdom of the wolf is very high, their relationship with their environment was very similar to that of the wolf. Both they and the wolf preyed upon the same ungulates in very much the same fashion. The wolf and the Native American may well have had an intimate knowledge of each other, albeit from a distance, and may even have enjoyed a symbiotic relationship of sorts, much as does the wolf with the raven: Some Native Americans today argue that wolves communicate the arrival of the caribou (*Rangifer tarandus*) by howling from mountain ridge to mountain ridge, thus aiding humans in the hunt. It seems unlikely, then, that Native Americans would have preyed upon or otherwise subjugated the wolf. Further, the wolf does not take well to captivity; it is an independent and untamable animal.

## **Hybridization**

The hybridization of wolves and wild dogs with the domesticate is not unknown. Crossing such hybrids would quickly lead to different types of canids and eventually some of the breeds we have today. Arguably the husky was first introduced as a Eurasian dog (fully domesticated or not) and



hybridized with the wolf, much as the malamute may have been. Apart from skeletal, behavioural and gestation differences, as outlined by Crockford (2002) there are few significant differences between the wolf and the husky. As with the wolf the husky generally grows no under coat along the spine allowing the guard hairs to be raised with ease to show dominance and/or fear; dominance being shown by the raising of the hair at the hackles only, where fear tends to bring about the raising of guard hairs along the whole length of the spine. As with wolves and in contrast to other modern dog breeds the husky and the malamute do not have a noticeable body or mouth odor. The faint odor which is detectable at close quarters is the result of scent glands located at the back of the face which serve to identify an individual animal. The temperament of the husky bears a strong similarity to that of the wolf, being highly social, gentle and affectionate and, like the wolf, it is a tireless stamina animal able to run over extremely long distances. The husky shares its barking inhibition and strong prey drive with the wolf which reflects its wolf ancestry. Huskies talk in a strange woo-wooing fashion and emit quiet but very high pitched squeals whines and squeaks and are known to eagerly participate in howling choruses. Barking, is generally reserved to illicit play in both the wolf and the husky. Huskies can be extremely stubborn animals and accept training with reluctance, a trait which harkens back in dilute form to the wild animal from which it was bred. In agreement with Corckford's findings (2002) the shorter muzzle, curled tail and diminutive size is consistent with reduced thyroxine. If bred from pre-domesticated wolves alone huskies must have been subjected to far less hybridization with dogs than other breeds, if any, perhaps due to the fact that they were raised in such remote areas of Siberia. Conversely, if the husky were created from wild or pre-domesticate dogs alone hybridization must have been substantial. In either event it makes sense that the husky and malamute are domesticated wolves. This is not to deny that the husky was selectively bred at some point. The Chukchi have raised huskies for many generations as a working dog: Most of our dog breeds today were created only about 150 years ago from crossbreeding animals of more ancient heritage; the Siberian Husky has quite a different story. The breed was developed by the Chukchi tribes of eastern Siberia, a group of nomadic peoples indigenous to what is now northeastern Russia who, according to recent genetic studies, are the direct descendants of the people who first crossed Beringia, as is the case with Native Americans.

The husky is most likely one of the oldest breeds and is thought to have come into being some

5,000 years ago. The breed was presumably bred not to be unlike a wolf as other breeds may have been but bred selectively to be human friendly with a slightly broader and deeper chest than the wolf in order to facilitate better breathing on long runs. Their apparent physical and behavioural differences from those of the wolf may inadvertently be due to the nature of the domestication process and nothing more. Like Belyaev's foxes the tips of husky tails are white, where those of the wolf are always black. That cross hybridization took place is probable given the example of the red wolf of Florida (*C. rufus*) which, from studies from mitochondrial and nuclear DNA, may well be a hybrid of *C. latrans* and the *C. lupus* but is generally considered to be a species of wolf which is quickly becoming hybridized with the coyote thereby bringing about the demise of the red wolf rather than being its origin (Nowak, 2002). Nowak holds that some hybridization has occurred between *C. lupus lycaon* and *C. rufus*, that they may represent a single species independent of all other *C. lupus* and *C. latrans*, and also that *C. lupus lycaon* has, like *C. rufus*, undergone hybridization with *C. latrans* (2002). Not only would husky/wolf hybridization have been an added bonus to the Chukchi by maintaining a healthy stock of new genes but would also have preserved much of the important survival and personality traits of its wolf ancestors. However, that the European wolf has not taken on the traits of the husky questions just how much hybridization has occurred. It may be that the offspring of female wolves by husky males already experienced reduced amounts of thyroxine and thus continually repeated the domestication process, returning to man's side. Crockford (2002) argues that the morphological changes resulting from domestication are dominant, hence any such hybrids born in the wild will likely have been prime material for independent pre-domestication. Given the striking similarity in appearance and behavioural aspects of domesticated dogs such as the husky and malamute with wolves, and the greater similarity in appearance of other dog breeds such as the golden Labrador, with Asian wild dogs, I propose that a bilateral speciation likely took place much as Crockford argues the independent evolution of *Homo sapiens* in Asia (Crockford 2002).

### **Man and Dog in the Americas**

During last ice age, 18,000 to 10,000 years BP, so much of the Earth's water was locked as ice in the polar regions, exposing a land mass known today as Beringia which was later to become

submerged by water shortly thereafter. It has long been assumed that man first came to the American continent 13,000 years BP via this land bridge and that this was the only incidence of man arriving on the American continent before Lief Ericksen 12,000 years later. This had been supported to some degree by the finds of Native American stone tools dated at 13,500 years BP found at Clovis, New Mexico, and referred to as "Clovis points". However, archeological finds from Ushki in Siberia, thought to be the original point for departure of the Clovis peoples' ancestors were recently re-dated at 13,000 years BP. This date coincides with the Clovis site in New Mexico (Heinrichs 2003). Coupled with the finds of human fossils at Monte Verde in southern Chile dated at 12,500 years BP, this time period has been brought into great scrutiny; it is unlikely that man could have made the long journey over glaciers sufficiently quickly to have arrived in South America when they did (Heinrichs 2003). The implication is that the Clovis were not the first peoples to arrive in the Americas and perhaps not the last. The Broken Mammoth site in central Alaska, dated at 14,000 years BP, with the site at Meadowcroft, Pennsylvania, dated at 16,000 years BP, strongly suggest this (Heinrichs 2003). From dental, linguistic and blood-group studies some biological anthropologists have found that most of their studies confirm tripartite division among modern Native Americans placing the peoples of the Amerind language group to have first migrated no later than 15,000 years BP, the Na-Dene speakers to have migrated from Siberia no later than 9,000 years BP and the Inuits and Aleuts of the Arctic to have arrived no later than 8,000 years BP (Willis 1996).

The Chukchi Sea, lying north of the Bering Strait and the coast that once would have been Beringia would most likely have been covered by ice during the glacial period, at least in winter, as may have been the case with the Bering Straits and the Chukchi Sea both before and after the ice age and still to some degree during the winters today (Mech 1998). On the 20th of March, 1998, Dmitry Shparo and his son, Matvey, managed to ski across the Bering Strait (Raissnia 1998). Although they rarely found themselves on solid motionless ice they were able to make the crossing none the less in 21 days, traveling a total of 185 miles to traverse the 50 mile strait. Thus an ice cap over the Chukchi Sea brings into question the long held belief that humans from the Eurasian continent could only have come to the Americas though Beringia during the glacial period, given that they could well have traversed the sea ice both before the land mass was exposed and since such times (Willis

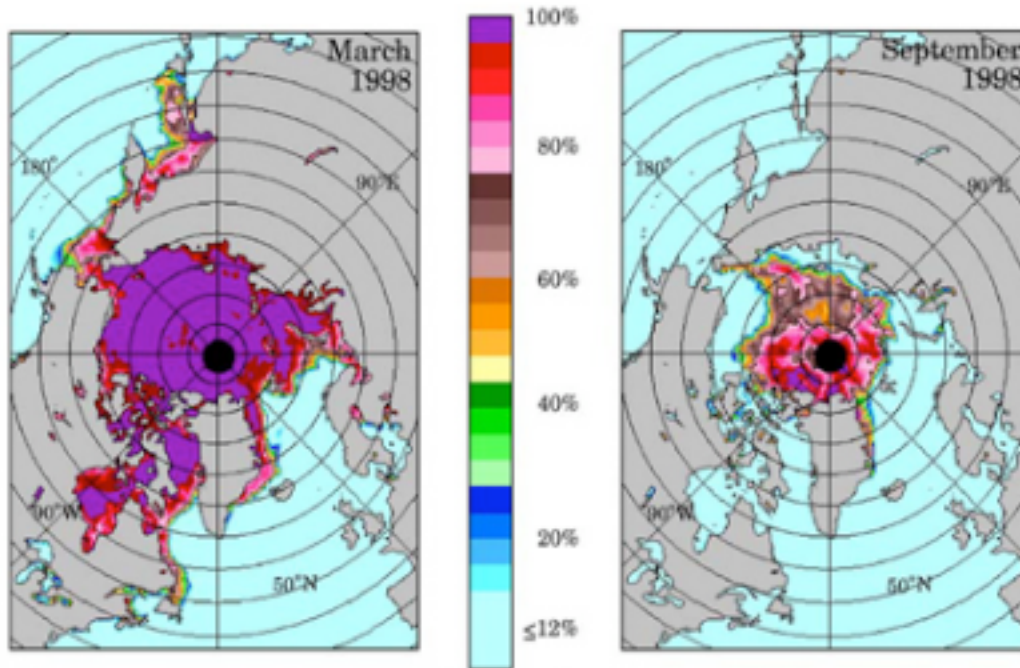
1996) (see figures 1, 2 and 3 below). Certainly Neanderthal man (*Homo sapiens neanderthalensis*) lived predominantly or exclusively in ice ridden environments as do the Inuit, Sami and Chukchi still. Caribou, and therefore modern man, wolves and dogs, must have been able to live on and to cross to and from the Americas. Man, wolf and dog, could well have come from the European mainland over land, ice or, in more recent times, by small boats, by way of Greenland, skipping along the ice-laden coasts during the ice age. Certainly the probable movement of man and wolf across sea ice has been demonstrated by the unaided reintroduction of *C. lupus* in Greenland resulting from wolves wondering over sea ice from Canada to Greenland since their extinction there in the 1930s (Nowak, 1995). That man was able to travel to the Americas after Beringia was submerged is further supported in part by the find in Washington State in 1966 of fossil bones of an individual referred to as Kennewick man in the eastern United States, a human skeleton dated at between 9,320 and 9,510 years BP. Kennewick man's skull is similar to caucasian skulls of southern Europe and unlike Native American examples (Chatters 1997).

The conclusion of a second study, based on mtDNA retrieved from ancient dog bones from Mexico, Bolivia and Peru, found that all the pre-Columbian dogs belonged to Eurasian dog lineages; in 1998 Dr. Robert K. Wayne and colleagues at the University of California at Los Angeles, showed that dogs were derived from wolves but he set their date of origin as a separate population at 135,000 years ago (Wade, 2002). This date overlaps with the disappearance of Neanderthal man 40,000 years BP (Tattersall 1999) by 95,000 years. Wayne, separately, with Dr. Jennifer Leonard analyzed the DNA of New World dogs, "...expecting to find that they had been domesticated by American Indians from local wolves. To exclude dogs brought from Europe, Dr. Leonard gathered pre-Columbian dog bones from archaeological sites and extracted their DNA. The samples matched [those] of Eurasian dogs, not American wolves, showing that dogs, of at least five lineages, must have been brought from the Old World to the New by pre-Columbian settlers. These pre-Columbian dog lineages have disappeared. Even New World breeds of dog like the Eskimo dog, the Mexican hairless and the Chesapeake Bay retriever, derive from dogs brought from Europe" (Wade 2002). This is not to rule out the possibility that pre-domesticated dog lineages could have arrived here in the first place by themselves rather than more recently with man and that the wolf in North America did not pre-domesticate as easily, if at all.

One must consider that there are many hunter/gatherer peoples whose exposure to other tribal groups is extremely rare. An example of this is the Chukchi (*Lygoravetlyan*) of north eastern Siberia. It is possible that even in quite ancient times the Chukchi enjoyed contact with the Inuit of Alaska and with the Ainu of northern Japan whether by land or sea crossings. Certainly a cultural commonality between these peoples is seen in the names *Inuit* and *Ainu* meaning, in their respective languages, "the people". Similarly *Lygoravetlyan*, the self-applied name of both coastal and tundra Chukchi, translates as "*true, genuine man*". (The coastal Chukchi distinguish themselves as *ankalyn*, "coastal man", and the tundra Chukchi as *chavchu*, "reindeer man", hence the Russian name, Chukchi.) The Apache and Navajo of North America similarly called themselves *Inde* or *Diné* also meaning "the people" while the Cree called themselves *Ayisiniwok*, again meaning "true people" or *Iynu*, simply meaning "people". The words *Ainu*, *Inuit*, *Iynu* and *Inde* bear more than a coincidental similarity not only in meaning but in pronunciation. In fact, the peoples of arctic Siberia, southern Alaska and the Inuit of Greenland all speak dialects of a language of the Yupik family. Possibly such populations were not as conscious of tribal names as western man may have been, simply referring to themselves as to what they were, people, rather than who they were. Although it is quite probable that the Chukchi, the Inuit and the Ainu were able to introduce Asian dogs into the tundra and to propagate their progeny across the Arctic circle it is most likely that the resultant dogs were regularly exposed to indigenous wolf genes: The Inuit are reported to tether female malamutes in oestrus far from their settlements in order that wild wolves impregnate them, while the Chukchi release their huskies during the summer months, thereby allowing for hybridization. It is also possible that the dogs of such dispersed and comparatively isolated peoples would, instead, have been the result of a sort of parallel domestication. It must be remembered here that mtDNA reflects genetic material passed from mother to daughter at a regular rate of mutation, allowing for reasonably accurate dating of contemporary groups. However mtDNA from males is not passed on to future generations and is lost to the historical record. Thus, in the case of the Inuit malamutes and Chukchi huskies, any male mtDNA introduced will have been lost even though it would have influenced the morphology of the offspring, clouding to some degree any wolf ancestry and giving a somewhat incomplete final picture.

*Figure 1a: Coverage of Arctic sea ice in March and September 1998.  
Image courtesy of Claire Parkinson/NASA Goddard Space Flight Center.*

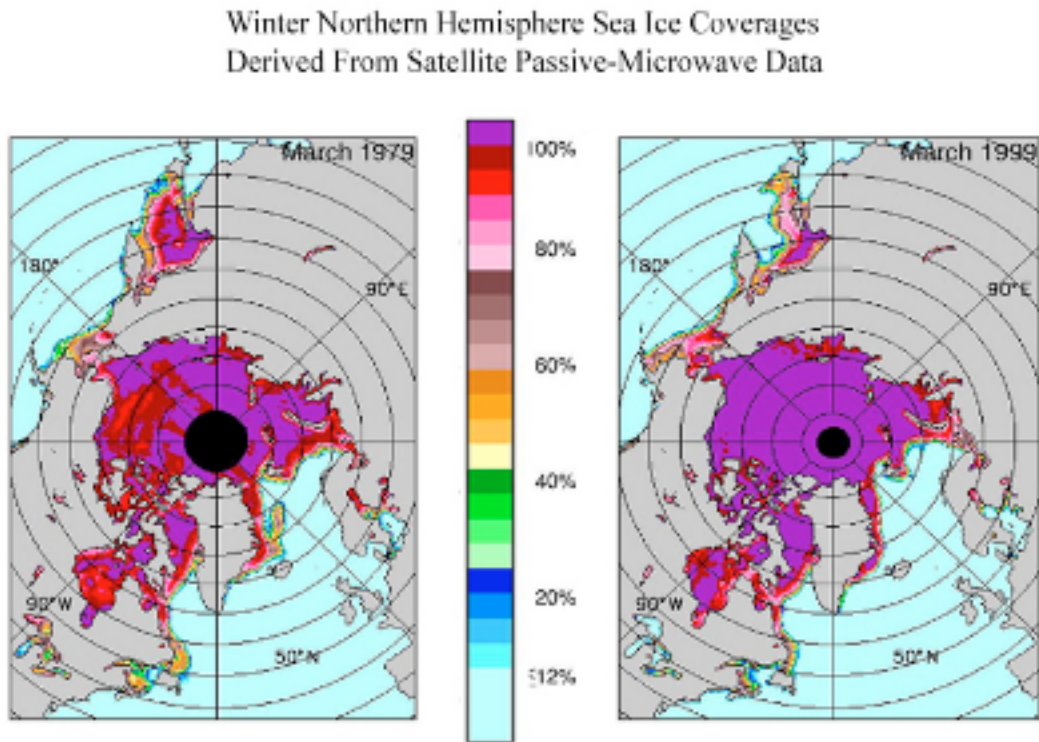
Winter and Summer Northern Hemisphere Sea Ice Coverages  
Derived From Satellite Passive-Microwave Data



The values mapped are sea ice concentrations (percent areal coverages of ice).

Figure 1b: Coverage of Arctic sea ice in March 1979 and 1999.

Image courtesy of Claire Parkinson/NASA Goddard Space Flight Center.





*Figure 1c: Enlarged view of coverage of Arctic sea ice in March 2002.  
Image courtesy of Claire Parkinson/NASA Goddard Space Flight Center.*

Winter Northern Hemisphere Sea Ice Coverages  
Derived From Satellite Passive-Microwave Data

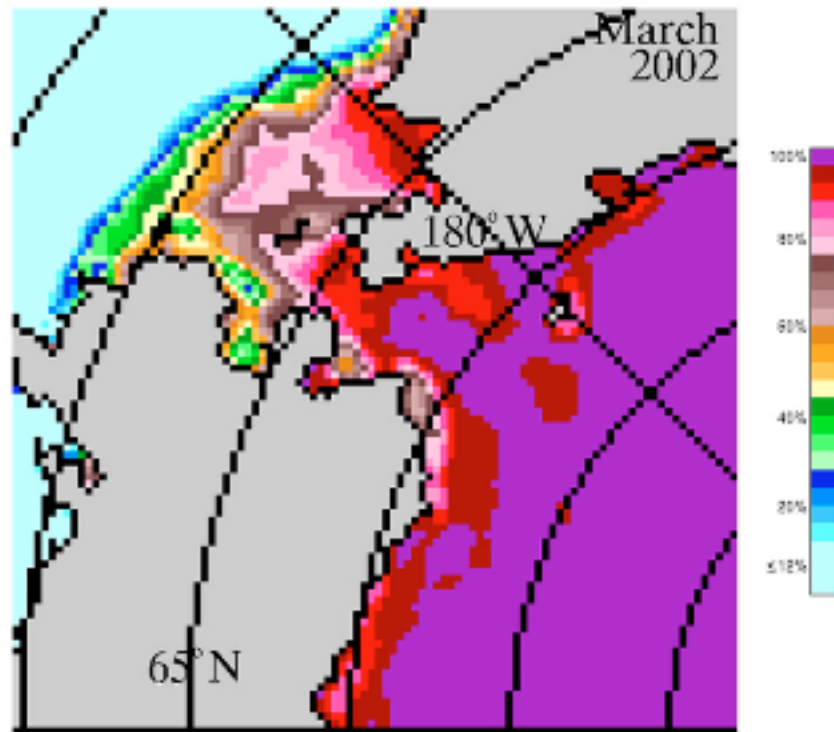
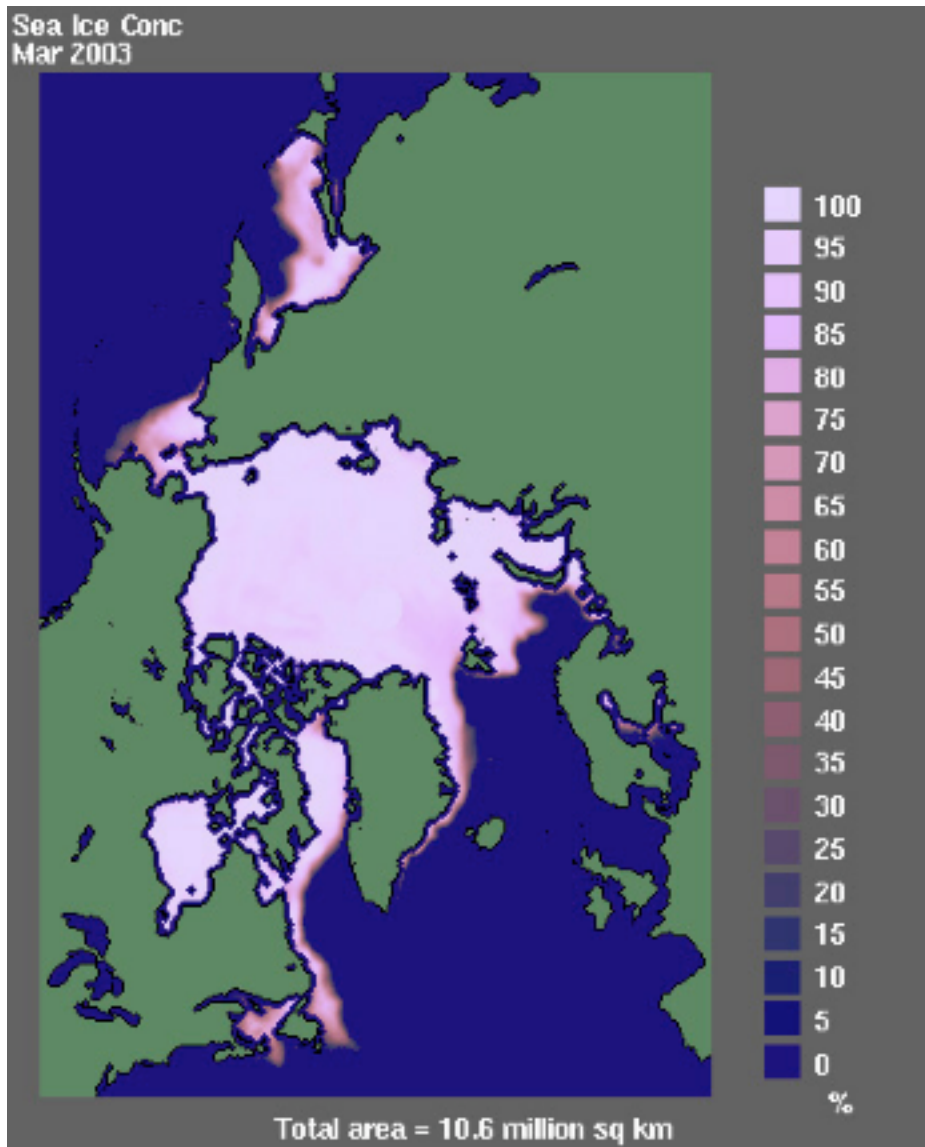


Figure 2: Concentration of Arctic sea ice in March 2003.  
Image courtesy of the National Snow and Ice Data Center,  
University of Colorado, Boulder.



*Figure 3: Sea ice around the Bering Strait, 04/22/02.*

*Image courtesy of the MODIS Snow and Ice Team.*



## **Curvus, Canis and Homo**

The raven (*Corvus corax*) indirectly alerts the wolf to carrion much as the wolf brings a recent kill to the attention of the raven: Many scavengers rely on predators to provide food for them, at least at certain times of the year such as crows, ravens, jays and red squirrels. "Thus it becomes more efficient for them to spend most of their time gleaning bits and pieces of leftovers from the abandoned kills of predators" (Mech:1981). Relationships are also built between individual members of a wolf pack and of a raven flock, demonstrated by the way in which ravens and wolves appear to play a game of tag at wolf kill sites as observed by Mech at Isle Royal in 1966; "[one] of the few birds that regularly maintain a close relationship with the wolf is the raven... [Flocks] of ravens routinely follow wolf packs from kill to kill and dine on the leavings of the packs... Another aspect of wolf-raven relations can be seen in the "playful" behavior indulged in by both animals... The birds would dive at the wolf's head or tail, and the wolf would duck and then leap at them. Sometimes the ravens chased the wolves, flying just above their heads, and once, a raven waddled to a resting wolf, pecked its tail, and jumped aside as the wolf snapped at it. When the wolf retaliated by stalking the raven, the bird allowed it within a foot before arising. Then it landed a few feet beyond the wolf and repeated the prank" (1966). It would make perfect sense for a similar reciprocation to have existed between man and wolf.

## **Conclusion**

There is a myriad of canine breeds still prevalent today, whether domesticated pets, wild dogs or wolves. A great deal of domesticated breeds, such as the pekinese and the dachshund, bear little resemblance to any wild canid either in their outward appearance or behaviour. Of those dogs which do appear similar to wild members of the *Canidae* family most fall into one of two categories, being more wolf-like in appearance and behaviour, or more wild dog like. From genetic studies of the domesticated dog and the wolf the argument has been put forward that all domesticated dogs descend from the Eurasian dog and perhaps in turn from the wolf. We may speculate that the wild dogs of Eurasia, the Americas and Australia are likewise descended from the wolf or shared a

common ancestor although they may have branched from the genetic line at a very early time, perhaps as early as 135,000 years BP or more. Given the schism in morphology of the northern dog breeds such as the husky, malamute, wool dog as compared to other domesticated dogs, a parallel evolution may be argued. The time period proposed for the domestication of dogs coincides with when anatomically modern humans were forming structured societies. The change in human social structure at this point in man's history may not have simply been concurrent with the domestication of dogs, but likely would have caused it. Given the interrelationship of wild canids and humans, their similar habits, ecology and familial structures, such an anthropogenic change in the environment could only have altered the environment inhabited by the wild canids, whether subtly or considerably, which in turn must have brought about a dynamic change in their hormonal balance and behavioural patterns. Given the new circumstances in which both man and dog now found themselves the relationship of one to another must have changed. It is not only the domestication of the dog, that being the subtle change from wild to human tolerant, nor the morphological evolution of the dog which is our only concern. Of great importance is the integration of the pre-domesticated dog into the human family and whether the dog arrived in the Americas independently of man, or was brought by man: And, if so, when. The wolf and the wild dog are exceedingly autonomous and independent with the wolf not being easily domesticated; the domestication of wild dogs, rather than of wolves is, in that light, far more likely as the main source for the domesticated dog. We can assume that wild dogs and domesticated dogs descend from wolves, but whether domesticated dogs descend directly from wolves or indirectly through already prevalent wild dogs, however intuitive, has not yet been plausibly demonstrated. Possibly some modern domesticated dogs descend either from the wolf or the wild dog directly. Modern man tends to view the world from a continental point of view, believing intervening waters to be impassible obstacles. Ice living peoples likely were less aware whether the ice they were living on was above solid rock or water. The distinction between the two would have been unclear. Such Arctic ice dwellers must have been so accustomed to living and traveling on ice sheets that movement between Eurasia and the Americas would almost have been routine and unremarkable. The Arctic should be viewed from the perspective of a single ecosystem rather than from the perspective of the continental geography it encompasses. Caribou, man, wolf, dog and raven all share a closely symbiotic relationship and their evolution must be interrelated. It should not be

thought that man, wolf or dog could only have migrated to and from the Americas by way of the shortest distance, nor that land must have been extant for such a journey to be undertaken.

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