# The Chinese Wolf, Ancestor of New World Dogs

## The earliest domestic dogs in the Western Hemisphere suggest a possible earlier ancestry in Asia.

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Present carnivores in the Western Hemisphere have ancestors that were well established during the Tertiary period. The early forms included canids that resembled cats, hyenas, and bears and forms that differed little from modern members of the family Canidae that includes the modern wolves, coyote, jackals, and domestic dogs. The doglike forms that were present in North America during the Miocene epoch were *Cynodesmus* and *Tomarctus*. Fossils remains indicate that both animals were quite common there (*1*). The evolutionary canid line continued through the Pliocene and Pleistocene epochs, culminating in the North American wolves, foxes, and coyote.

Apparently the first canid migration, from North America to Asia, took place during Pliocene or early Pleistocene times. The genus *Canis* (which includes wolves, jackals, coyote, and domestic dogs) is reported from the Villafranchian or lower Pleistocene levels in North China at the archeological site of Chouchia-yu-fang (*2*). Whether the recovered remains represent a small wolf or an early domestic dog (that is, a tame wolf) has not been established. Animals determined as tamed wolves have been found elsewhere. Among the earliest are a number of tame wolves that were found at Upper Paleolithic mammoth-hunter stations at Mezine and at similar sites in the Ukraine, dating to the latter phases of the Würm glaciation (*3*). These canid finds were identified as *Canis lupus familiaris* or tamed wolves. This determination was made on the basis of the presence of a shortened face, which is not a character of the skulls of wild wolves (*4*). One of the first changes that takes place in the domestication process of canids is the shortening of the rostral or facial area, as well as a general reduction in tooth size.

A small partial mandible of a doglike canid was recovered from a post-Glacial deposit in east-central Illinois in 1938 (*5*). The nature of the deposit, the lack of additional material of this form, and the possibility that this fragment could be of an aberrant wild canid of a more recent period prevent further comment on this find. However, the fragment must be noted in any discussion of early doglike canids from the New World (Fig. 1, upper right).

The canids usually regarded as being ancestral forms of the domestic dog include the wolf, the jackal, and the coyote (Fig. 2), or combinations of these species. Most workers who have investigated these wild forms agree that only the wolf exhibits the social behavior that puts it in a favorable position for taming and domestication (*6*).

The wolf, *Canis lupus*, is circumpolar in distribution, and the genus contains more than 30 recognized subspecies. The division into these subspecies is based for the most part on pelage color or pattern rather than on osteological characters. The larger species are native to the Western Hemisphere (Fig. 2), and, of the smaller species, *Canis lupus chanco*, the Chinese or Asian wolf (Fig. 2), is the most likely ancestor of the early domestic dogs of China and Mongolia, as well as of those dogs that perhaps accompanied man to North America over the Bering Strait.

We do not exclude the possibility that large northern wolves, such as *Canis lupus lycaon*, were ancestors of the more recent large Indian dogs of the northern United States (Fig. 2). In fact, Eskimos are known to breed huskies with wild wolves to maintain the strong stock needed in a rugged environment.

All of the identified early domestic dogs from North America are small, advanced forms, but they unquestionably belong to the species *Canis familiaris*. Some link between these animals and the first tamed small wolves must still be sought.

The oldest dog on the North American continent (and, for a number of years, in the world) is an animal known as the Jaguar Cave Dog (*7*). This animal (Fig. 1) has a radiocarbon ($^{14}C$) date of 8400 B.C. and is known from a number of fragments representing several individuals of varying size. However, the individuals represented all appear to be small advanced domestic forms.

The gap between the period associated with the identified early domestic dogs from North America and the period in which remains of domestic dogs become quite common in archeological sites is rather great. The later Basketmaker and Pueblo Indian dogs, as well as the larger Northern Indian dogs, are known to have existed from about the beginning of the first century A.D. up to present times. They are commonly associated with many different cultures (Fig. 1) and have been discussed in some detail in an earlier paper (*8*).

Most of the articles about the ancestry of domestic dogs deal with animals that are found in Europe or the Near East. Some European domestication experts think that reports of early domestic dogs found in North America are subject to question. For example, one investigator states, regarding the Jaguar Cave and the Illinois Pleistocene dog, "There cannot therefore be any doubt about the domesticated state of these dogs, although dating of their remains may seem exceedingly early for American dogs" (*9*). Again, a European zooarcheologist remarked "according to our present evidence the earliest remains of domestic dogs were found—against all expectations—in North America" (*10*).

The latter remark was made before the discovery of an older dog, now the oldest domestic dog to date, in the terminal Pleistocene region of Palegawra Cave in northwestern Iraq (*11*). The Palegawra dog has been given a radiocarbon date of 12,000 years before the present. It is appropriate to mention the possibility that domestication of the dog took place independently in several widely separated places in the world. Certainly the Near East is a likely center, based on the evidence that has already been assembled and is being analyzed by other workers; but other areas, such as Soviet Asia and

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possibly even the New World, must be considered.

Two difficulties have been associated with research on early finds of Chinese canids. The literature appears entirely in Chinese, a language not generally mastered by Western Hemisphere workers, and the critical canid material in the vertebrate collections in China was not available for examination until recently.

At the site of Chouk'óutien, 42 kilometers southwest of Peking, some vertebrate remains were found in close association with *Homo erectus pekinensis*. An approximate date of 500,000 years ago can be set for the period of maximum *Homo* utilization of the cave's lower area. The canid found along with Peking Man has been described as *Canis* sp. (*12*). It was later renamed as *Canis lupus variabilis* (*13*), for, as was noted, it differed from the common wolf of the area only in that it was a bit smaller with a more slender muzzle and a weak sagittal crest (*13*). Three years earlier it had been designated (*14*) as *Canis sinensis*, but no reason was given for this taxonomic assignment. In 1972 it was given back the original designation of *Canis* sp. (*15*).

The foregoing discussion of the many changes in taxonomy made for the same specimens by a number of investigators serves to emphasize the problem of determining early associations of hominids and canids. The partial skulls and mandibles found at Chouk'óutien (and exhibited in collections at the museum there) do, indeed, appear to be those of a small wolf. For an accurate taxonomic assignment, these rare, early wolves should be thoroughly compared with a series of other canids, including specimens of the Chinese wolf, *Canis lupus chanco*. A start in this direction (*16*) was made by Allen who compared similar wolf material and placed, in synonymy with the present-day Chinese wolf, the earlier described forms, *Canis chihliensis* and *Canis lupus laniger*.

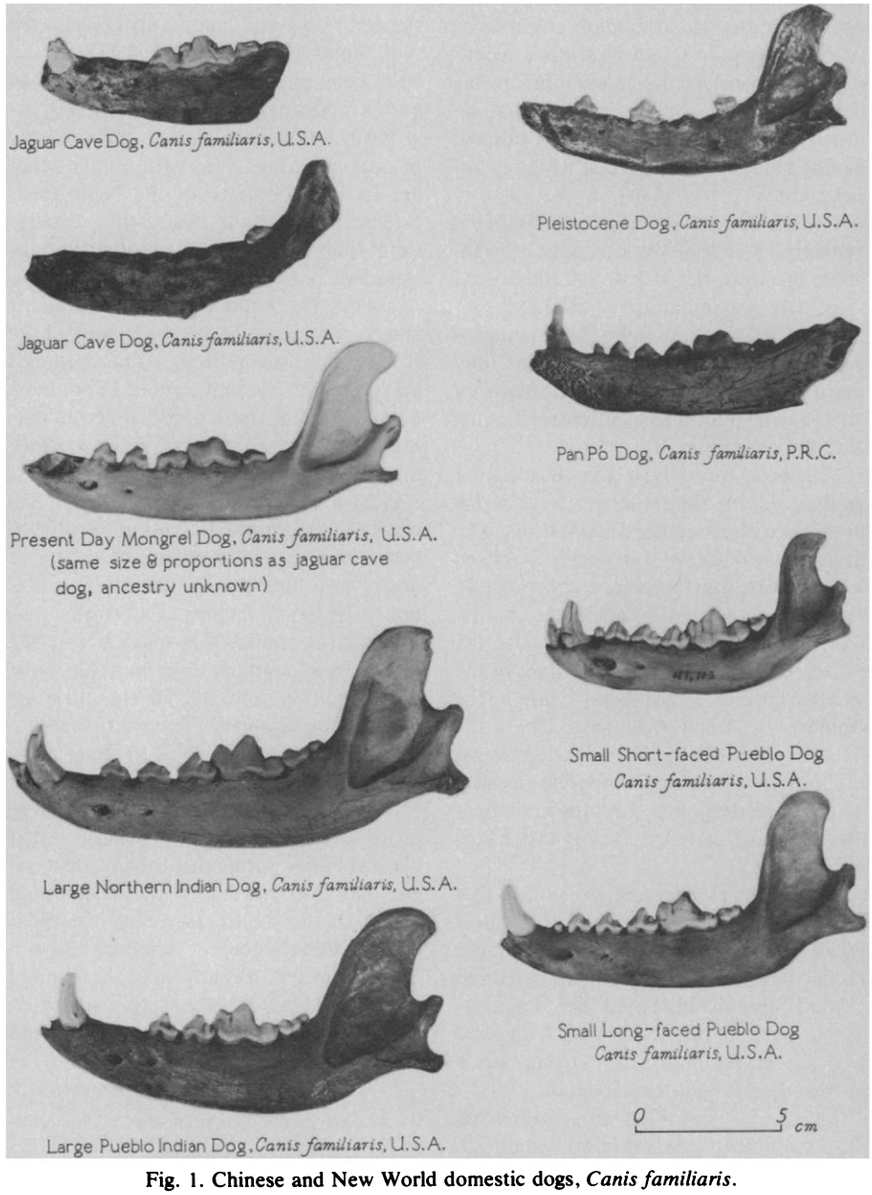


Fig. 1. Chinese and New World domestic dogs, *Canis familiaris*.

In China, as in North America, there is a definite temporal hiatus between the earliest known representatives of *Canis* and those from later sites that have been designated as *Canis familiaris*.

Domestic dog remains, consisting mainly of mandibles, have been recovered from the Neolithic village of Pan p'o (4865 ± 110 B.C.) near Sian in Shensi Province (*17*). These are advanced domestic animals and are comparable in size to the large Pueblo dogs of the southwestern United States (this in no way implies association).

Mention in the literature is also made of early dogs from sites in the Lake Baikal region and Ust'-Belaia in Siberia (*18*), the latter having a date of earlier than 9000 years ago. Chard also refers to a "domestic dog or wolf" from an Upper Paleolithic site on the Yenisei River (Afontova Gora II, Siberia), which has been provisionally dated to 20,900 ± 300 years ago (*18*). These early canids are difficult to restudy because they cannot be located in collections. In some cases they were not saved after initial notes had been taken on specimens observed in the field.

Vertebrate paleontologists and zooarcheologists rarely have adequate osteological material with which to work. Complete skulls or mandibles are rare. Fragmentary jaws or teeth must be examined with particular care to establish criteria that will enable one to identify and taxonomically distinguish these incomplete elements. The morphological characters that are used as criteria to distinguish domestic dogs from similar but wild canids are those that, in every case examined, do in fact serve to make the distinction. In some instances, however, even though the characters are constant and different for the wild and domestic *Canis*, the reasons for this difference may not be possible to establish. However, this does not lessen the value of the distinguishing character.

One morphological feature that is diagnostic for the domestic dogs was present in the modern Chinese wolves (*Canis lupus chanco*) examined but not in the larger subspecies of wolves. This character is the "turned-back" apex of the coronoid process of the ascending ramus (Fig. 2). The reason that domestic dogs have this feature is not clear, but it is generally absent from other canids, except the Chinese wolf.

This area of the ascending ramus of

the mandible functions in the following way. The muscles of mastication, that is, the temporals, the masseter, and the pterygoideus, all have their insertion on the coronoid process to one degree or another. Their combined purpose is to close the jaws. However, the pterygoideus medialis and pterygoideus lateralis assist in that purpose, particularly by the shearing action required for cutting heavy fibrous tissue. They also permit the lateral action characteristic of chewing.

The degree of development of the coronoid apex is another feature that is diagnostic for dogs that may be useful in linking domestic dogs to the Chinese wolf. In the true "meat-eating" carnivores, such as cats (Felidae), there was no overhang in this area. The apex was terminated in a symmetrically rounded crest. The same was true of the badgers and otters (*Taxidea* and *Lutra*, respectively). However, there was a noticeable overhang, similar to that in dogs, in carnivores with an omnivorous diet, as in bears (Ursidae). This modified mandible may be that of an omnivorous carnivore, rather than that of a strict carnivore. This is true for the domestic dog, and it may be true for the Chinese wolf, although there is no evidence that the Chinese wolf has a more varied diet than that of its North American counterpart. The evidence suggests that more investigation is needed to determine the use and function of the overhang and the relation to diet or subsistence strategy.

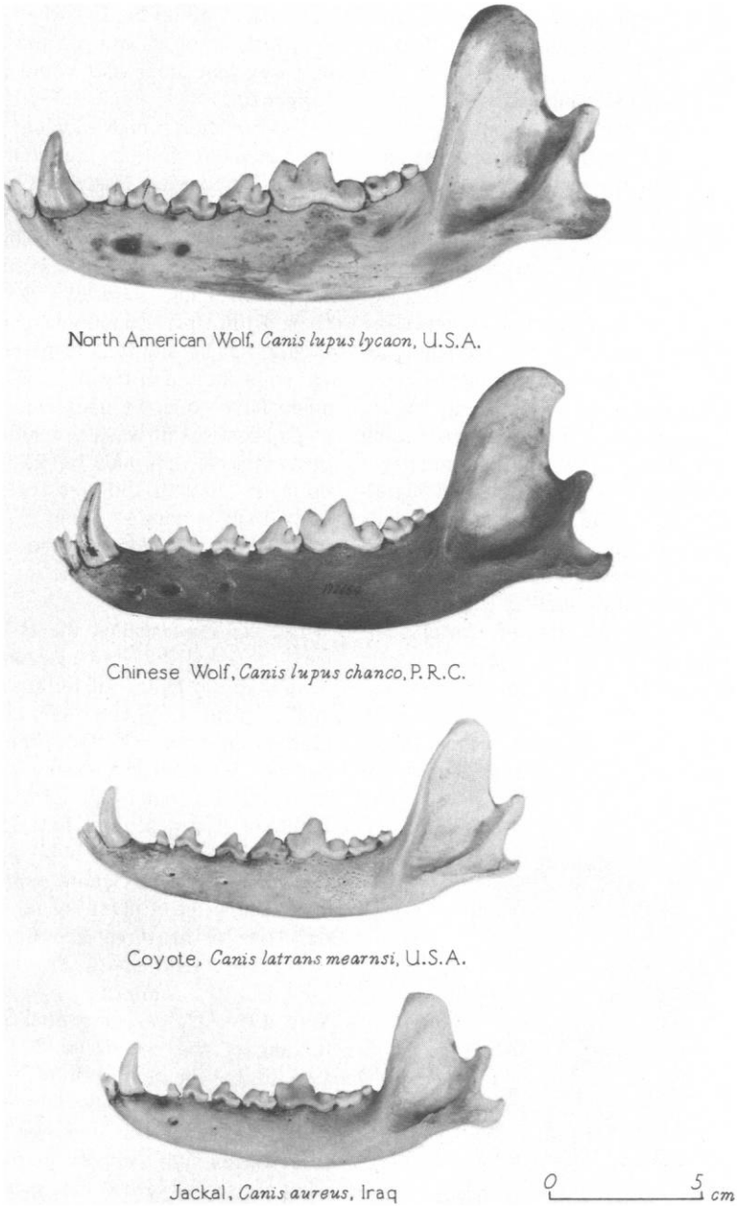


Fig. 2. Canids generally attributed to be possible ancestors of the domestic dog.

It has been reported (*19*) that canids, as yet undescribed, have been found at Lan-tien, Shensi, and at Yuanmou, Yunnan, but beyond that no other new material has turned up. Exploratory work for new occupation sites now under way in the vicinity of the Bering Strait may turn up canid remains, in association with humans, and will perhaps help solve some of the perplexing problems relating to man's oldest domestic animal. Research workers in China are continuing new excavations as well as returning to older sites such as Chouk'óutien, to uncover new canid finds, in association with early hominids. There also exists the possibility of an exchange of workers and the use of scientific collections with a view toward solving mutual problems.

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20. We thank the government of the People's Republic of China for making it possible to see specimens in the collections at Chouk'óutien near Peking and at the Museum at Pan p'o in Sian, Shensi Province.