In Dogged Pursuit: A Reassessment of the Dog's Domestication and Social Incorporation

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Dogs and Humans

Dogs and humans have a strong social and economic bond that spans thousands of years. The ubiquity and multiple roles of dogs are testaments to their importance for present peoples. As such, it does not come as a surprise that the dog is one of the most intensely studied animals. It has received a lot of attention from various fields of inquiry, not least of them is archaeology. But why did humans develop strong bonds with this particular domesticate? And when did the dog become man's so-called best friend? We observe sociality, affection, and different skills among contemporary dogs so it is unsurprising why dogs and humans in the present are so closely linked. But how about in the past? It is hypothesized that the dog is the earliest animal domesticate. Dog remains are found in archaeological sites throughout the world and a lot of them are found in peculiar contexts. Also, as shown by recent molecular genetic data, the dog has a long and equally unique genetic history. Modern dogs would not be as they are now if not for their lengthy interaction with humans and for the various breeding programs humans have subjected them to. Indeed the domestic dog would not be what it is now if not largely for humans—they would most likely remain as *Canis lupus* or might have evolved towards an entirely different direction. This is not to say that dogs were passive receivers of humans' selection. As we shall see later on, it may just be the exact opposite.

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Of Domesticates and Domestication

Before we take a closer look at the origins and long history of this domesticate we must first tackle the much deliberated concept of *domestication*. A variety of opinions on this subject—sometimes conflicting, often overlapping—can be seen. To demonstrate the wide range of viewpoints, let us look at some definitions provided by different authors. One classic definition is that of Bokonyi's (1969 in Russell 2002:287), which reads as: "...the capture and taming by man of animals of a species with particular behavioral characteristics, their removal from their natural living area and breeding community, and their maintenance under controlled breeding conditions for profit."

For Clutton-Brock, a domesticated animal is "...one that has been bred in captivity, for purposes of subsistence or profit, in a human community that maintains complete mastery over its breeding, organization of territory, and food supply" (1994, in Russell 2002 and O'Connor 2000).

Ducos also presents another view, saying that domesticates are those animals that have been "integrated as objects into the socio-economic organization of the human group" (1978, in O'Connor 2000: 150).

This discourse rings of many dichotomies, all underlain by the persistent nature/culture debate. Most, if not all, authors explicitly recognize both biological and social aspects of domestication but they all have their leanings. On one side there are those that emphasize the biological facets (usually owing to their field of specializations) such as the processes of inheritance, evolution, and breeding. Others like Ducos focus on the social incorporation and behavioral change of animals.

Early formulations on domestication highlighted humans' domination of animals. Even at the present, the dominant perception is that animals are economic resources that humans can exploit—whether as food, livestock, beasts of burden or for other practical uses. Ingold (1996) perceives these views as part of the grand narrative of humans' transcendence of nature. Childe is a major player in this grand narrative, and for him domestication was an important step in the human career. It was fundamental to what he famously called the Neolithic Revolution. The prevailing assumption then was that domestication successfully provided secure and regular sustenance whereas hunting and gathering was more unpredictable and less productive. With drastic climate changes and ecological crises that human groups were facing at the end of the Pleistocene, humans also had to radically change the ways by which they obtained their food. This oversimplification was of course a product of its evolutionist milieu. There is a consensus that the gradual onset of domestication marked a major socio-economic

transformation of human societies but it has also been demonstrated that the hunting-gathering lifestyle (that *other* way of life) is not the inefficient schema that it was thought to be. Ethnographic data on many hunter-gatherer groups have clearly shown this.

For Ingold, also integral to this grand narrative is Engels' discussion of domestication in the context of production (Ingold 1996:13). In his book *Dialectics of Nature,* Engels contrasted man and animal, believing that the act of producing his "means of life" set him completely apart from animals and from nature in general. Animals may also modify their environments but not with the careful, conscious and purposive strategizing of humans. Animals simply had "no conception of [their] task[s]" (Ingold 1996:13).

As suggested earlier, an important aspect of this debate concerns the weight placed on control. Contemporary authors like Clutton-Brock deliberately use the word mastery, to emphasize that humans are in a position of domination, albeit for reasons apart from the glorification of human achievements. Nonetheless, commentators like O'Connor (2000) favor a less anthropocentric position and say that both humans and animals benefit from the situation. This perspective agrees with Zeuner's (1963) early symbiotic model of domestication. This point of view raises the dichotomy between intentionality and "self-domestication." But as Russell (2002) observes, it all depends on what one means by "benefit." For domesticates like dogs and cats, the situation does lean more on the mutualistic side although early relations between them and humans could have been more commensal in nature. Moreover, because of the wide geographic and temporal occurrence of deliberate dog burials in the archaeological record and our contemporary biases over dogs, our interests are drawn more into their *social integration* and roles in ancient societies.

Uerpmann (1998) has presented a niche hypothesis that runs parallel to the symbiotic model. He believes that in the Upper Paleolithic of Europe, wolves began to establish a shallow niche within human circles. With changes in the environment and improvements in technology, humans were able to prey on animals that were beyond the hunting capacities of wolves, which then scavenged for the remains of the carcasses. This wolf/dog-human relationship began to take on new forms at the end of the Pleistocene when forests began to blanket the once broad steppes of Europe. Some humans discovered the "remote sensing" capacities of wolf puppies—that they can sense prey even in the thickness of these forests—and hence adopted and trained them. As such the wolf/dogs began to establish a deeper niche within human groups.

Canis lupus familiaris: Morphology and Evolution

In 1993, the Smithsonian Institute and the American Society for Mammals reclassified the dog as *Canis lupus familiaris*, thus confirming the wolf ancestry of the dog. Based on ethological, molecular genetic and morphological studies, it has been conclusively shown that domestic dogs originated from *Canis lupus*, the gray wolf (Vila *et al.* 1997, Olsen 1985 in Leonard *et al.* 2002, Morey and Wiant 1992, Morey 1994). At present, the dog is considered the most morphologically diverse domesticate, with more than 400 breeds. How gray wolves evolved and became domesticated to achieve such varied forms is a matter of considerable debate and inquiry. A combination of the processes of natural selection, "social evolution" and domestication are currently believed to be responsible for such diversity.

As mentioned in the preceding discussion, intentional domestication by humans lay beneath much of previous hypotheses. Humans probably took in wolf puppies and reared and deliberately tamed them. But this notion is currently undergoing substantial revision. Many now actually believe that dogs initiated their own domestication by forming their own niche among human circles and continuously entrenching themselves there. This specific niche began to appear when humans became increasingly sedentary. An initial natural selection for tameness must have occurred since to live in this niche, wolves must be unafraid of humans and yet unaggressive towards them. Authors like Coppinger and Coppinger (2000) elaborate this theory of "self-domestication" in their work.

Morey (1994) presents what can be called a "social evolution" hypothesis—the dog's "evolution in a domestic setting." He considers that this morphological and behavioral pedomorph (one that retains juvenile characteristics) evolved as a byproduct of the natural selection for features that would increase their fitness for colonizing the human ecological niche. The retention of juvenile characteristics like a reduced snout and smaller overall body size may have been partly favorable, even endearing, to past peoples. No doubt, that is a common perception among contemporary dog lovers. However the pedomorphosis, as Morey notes, was taking place ubiquitously around 10,000 to 14,000 years ago and thus many other factors may have been involved. Selection pressures for social compatibility, reproductive timing and body size could have eventually produced the pedomorphic dog.

Studying archaeological remains of dog-wolf hybrids or crosses would help define the social evolution of the dog. With the fragmentary nature of available data, this may be difficult to currently substantiate, though Olsen (2000) provides some examples: from a late Paleolithic site in Chernigov, Ukraine; Ipiutak, Alaska; Garnsey bison-kill site, New Mexico; and Bagnell Site, North Dakota.

Because of the whole suite of natural and artificial selection processes that were involved in the dog's domestication, what we now have is a morphologically very distinct canid, with pedomorphism as a main attribute. Dogs possess a roster of attributes that differ significantly from other canids, especially from gray wolves. They have a reduced rostrum, palate and cranial vault (Morey 1994) as well as diminished occipital and supraoccipital crests (Olsen 2000). The dental morphology is also smaller and quite modified. A distinct example for this is the morphology of the lower carnassial, with its bicuspid talonid. Similar to other domesticates, tooth crowding is also a criterion for comparing the domestic dog with wild canids. Other characteristics of domestication are enumerated by Zeuner (1963:102): the raising of the braincase relative to the bridge of the nose, short-leggedness, erect tails, lop-ears, piebaldness and single or uniform fur color.

Social Roles and Symbolism

Attitudes towards domestic dogs vary in time and space. Indeed, animals in general can have a variety of purposes and roles in specific situations (Ingold 1996). They may not statically fit into categories like "livestock," "pet," or "food." Again the dominant perspective is still the dog-as-hunter view but as varied examples can show, attitudes towards the dog can be very different in various settings. Of course the economic and practical value of dogs cannot be discounted. Dogs are often part of hunting excursions—whether in traditional hunting groups or in sporting hunts. Dogs have also been utilized as beasts of burden, as guides for the handicapped, police dogs and are of course excellent companions—the proverbial best friend of humans. In many places, dog meat is considered a delicacy, like in East Asia, Borneo, northern Sumatra, Java, and closer to home, in the uplands of Northern Luzon. For example, among the Batak of Sumatra, dogs (along with chickens, pigs and buffalo) were butchered and eaten for certain festivities like the changing of dwelling, finishing a new house or during visits of important individuals (Loeb 1935). Datan (1993: 119), in quoting St. John (1863), notes that the Bidayuh occasionally sacrificed dogs along with pigs and fowl, although unlike the last two animals, the dog is not consumed since only its blood is needed. Another example comes from the infamous Philippine exhibition in the 1904 St. Louis Exposition. To the indignation of current Filipino scholars, the "dog-eating Igorots" were said to be a major attraction among awestruck visitors. At present, dog meat is readily cooked, when it is available, by numerous Filipinos—from whichever province, town, barangay or street corner—for their drinking sessions or for certain occasions. On the other hand, in many contemporary Western societies, a food taboo is placed on dog meat. Pet-loving Westerners are plainly aghast with the thought of

eating dog meat. But this taboo is not limited to the West. Many groups put great economic or symbolic value on the dog and thus, eating dog meat is avoided or even completely prohibited. Such is the case for both the Hanunoo Mangyan in recent times (Conklin 1957), and among the Bisaya in the 17th century (Alcina 1668). In these cases, dogs are valued more for their capabilities rather than their meat.

Some ethnographies on different ethno-linguistic groups provide more detailed descriptions on peoples' relations and attitudes towards dogs. A good example comes from Harrisson's (1965) preliminary research on the communication systems among the nomadic Punan Busang and their dogs. In 1965, he joined and observed this Punan group who were living in Sarawak and which were then composed of 109 individuals. They owned a total of 153 dogs, approximately five for each family. These dogs were classified into "good" and "bad" based wholly on their hunting capabilities. They have individual names and each name has a corresponding call or "signature tune" to which each dog is taught to respond. The Punans value their dogs because of their hunting abilities and this is partially reflected in the spatial arrangement of their family huts and in the various intricate superstitions related to the dog. Dogs have their own platforms or beds inside the huts. Several prohibitions are also imposed like the cooking of pigs' bladders and urinary tracts, or the inclusion of dogs in a hunt when a person in the family hut *sneezed* in the morning. The violation of these taboos will make dogs lazy or will actually cause injury and death to the dogs.

Attitudes towards dogs are also reflected in local myths. Again among the Punan Busang, they tell a story about the origins of the dog, believing that it was created by a ghost named Ling Lunggau specifically to help assist the locals in their hunting forays. The Ngaju Dayak of southern Borneo have also incorporated dogs into their mythology (Loeb 1935). One interesting story involves the justification of headhunting among other native groups. It is believed that two neighboring tribes were descended from a monkey and a dog, both of which were once possessed by the Dayak as domestic animals. The animals ran away to another place, and there took human form. These animals are thus believed to be the ancestors of these two other tribes. This mythological origin is said to underlie the basis for the taking of heads: members of other tribes are considered as objects which one had property rights over and so the act is not considered as desecration of a person's life.

It is very possible that such roles of and attitudes towards dogs could have been present in ancient societies, but this we cannot say with certainty. What is clear though from the proliferation of dog burials in archaeological sites worldwide is that dogs did have unique social import. The geographic and temporal breadth by which dog burials appear are testaments to their social significance. True, other

animals have also been deliberately buried, but not with the same frequency as dog interments. Morey (2005), in an important paper entitled "Burying the Evidence" discusses in convincing detail the worldwide distribution of dog burials and the significance and spiritualism attributed to dogs. Morey collates data from the Old and New World, but especially from the latter where he has most access. The data is admittedly not exhaustive but it sufficiently demonstrates the extensive spatial and temporal distribution of dog burials. Dog burials recur in various chronological periods in different areas of the Old World as demonstrated in Table 1. In Eurasia, one of the oldest dog burials was recovered from Ushki-1, Siberia, dated to ca. 10,650 B.P. Four Mesolithic dog burials were also recovered in Lepenski Vir, Yugoslavia (9,500–8,500 B.P.). In North America, the oldest dog burial is that from Koster, Illinois, which has been dated to 8,500 B.P. (Morey and Wiant 1992).

A common mode of burial is the individual, unmarked interment. This mode is dramatically amplified in the ancient pet cemetery of Ashkelon, Israel. A total of 1,238 dogs were found and their context is dated to about 822–428 B.C. (Wapnish and Hesse 1993, in Olsen 2000). The dogs were placed individually in their graves, usually on their side with the tail curled towards the feet. The meticulous arrangement of the graves leads some observers to say that such reverence bordered on worship.

The care employed in burying dogs and puppies show that they were not just dispatched for hygienic purposes but were instead treated that way because of their value to humans. Morey provides several more examples of sites where careful burial treatment of dogs were observed: in Lambert Farm, Rhode Island; Anderson Site, Tennessee; and in Ipiutak, Alaska. In the first example, soft-shell clams were placed around the dog most likely as grave offerings. In the Anderson Site, a very old and sick dog was ritually buried. Its pathology shows that the dog had obtained several injuries and illnesses throughout its life and without human care, this animal could not have possibly survived such physical traumas. In the last example, a log tomb was specially prepared for the burial of a dog.

Another mode of burial is the simultaneous human and dog interment. The Natufian example of Ein Mallaha in northern Israel is perhaps one of the best known. The context of the tomb is dated to 11,000–12,000 B.P. (Davis 1987). In 1977, Francois Valla unearthed this find consisting of a burial of an elderly woman with a puppy lying underneath her left hand (ibid: Fig. 6.20). Another well-known find comes from Skateholm, Sweden and reported by the archaeologist Lars Larrsson. In this example, a man and a dog were buried together, with the animal laid out at the man's legs. These kinds of interments clearly signify a special relationship between humans and dogs as well as suggesting that dogs were important enough to be part of humans' beliefs on the "afterlife."

Now it is not always the case that dog-burial remains imply friendship with humans. Sometimes, ritual significance is indicated by the ceremonial treatment and sacrifice of dogs. The ancient Greeks are known to have simultaneously sacrificed humans and dogs. In Hittite contexts in Anatolia, ritually treated dogs were also discovered (Morey 2005). In the Bronze Age of Thailand, interring dogs' crania with humans was frequently observed (*see below*).

Another very good example comes from White et al. (2001) who present isotopic evidence indicating Maya patterns of dog use at Preclassic Colha in Belize. Most of the dog remains come from middens but three dogs were found in caches within ancient structures. One of the middens was associated with a ceremonial structure. This last inference, along with the isotopic evidence and ethnohistoric data strongly point to the possibility that dogs from the Late Middle to Terminal Late Preclassic periods were being purposefully fed with maize for ceremonial purposes.

As demonstrated throughout this section, dogs in prehistoric and historic times were not simple domesticates that were bred or cared for just for economic purposes. The abundance of dog burials in different contexts throughout countless sites reflects their symbolic and ceremonial value as well as their social status in ancient societies. As Charles (1997) notes, there are cases and contexts wherein a symbolic explanation is logically the most appropriate. It would indeed defy logic to opt for techno-economic justifications in a situation that potentially provides an opportunity to glimpse into ancient belief and social systems. The study of dog burials has partly enriched our understanding of ancient human-animal relations, animal friendship and ownership, and ritual practices.

The Question of Origins

In this section, we now confront the most controversial aspect of dog domestication: its origins. As mentioned earlier, it has been established that gray wolves are the "grandpaws" of domestic dogs. However, what is quite problematic are the questions of when and where the domestic relationship between dogs and humans actually began. Archaeology presents substantiated evidence of the existence of domestic dogs at least 14,000 years ago. But some molecular geneticists contend that the domestic dog's lineage broke away from that of the wolf much earlier—perhaps as far back as 130,000 years ago. As for the "where," many archaeologists and geneticists believe that there were multiple and "multiregional" episodes of evolution, with domestic dogs arising from and interbreeding with local wolf populations in different parts of the globe. But again, some geneticists think otherwise and are proposing an "out-of-China" scenario.

Dog Remains in the Archaeological Record

The earliest dog remains come from Bonn-Oberkassel in Germany (Nobis 1979 in Leonard *et al.* 2002). The specimen, dated to 14,000 B.P., originally consisted of a complete skeleton, but due to taphonomic processes (quarrying and excavation procedures), what has been publicized in much of the literature is only a piece of the dog's mandible. Street (2000, in Morey 2005) recently made two clarifications about the specimen. Firstly, it is really of a dog and not just of a dog-like canid. Secondly, the dog's skeleton was also part of a human double grave and as such the remains not only represent the earliest dog in the archaeological record but the earliest human-domesticate interment as well.

Early dog remains (11,000–12,000 B.P.) were also discovered in the Zarzian site of Palegawra, northwestern Iraq (Turnbull and Reed 1974 in Payne 1983) and Ein Mallaha, Israel. The canid mandible found in Palegawra was analysed and compared to the cranial and dental morphology of wild species in the area. The mandible is relatively small compared to the Zagros *C. lupus* and its dentition is more similar to *C. lupus* than to *C. aureus* (golden jackal). In North America, the oldest well-documented dog remains come from Danger Cave, Utah (Grayson 1988, in Morey and Wiant 1992) and date to 9,000–10,000 B.P. In China, which several molecular geneticists believe is the "homeland" of the domestic dog, archaeological dog remains have so far been found only in the early Neolithic (*see below*). A couple of examples are Jiahu and Xiawanggang in Henan province (Olsen 2000: Fig. II. G.8.1). In Southeast Asia, the earliest dog remains are of Neolithic age, starting at around 3,500–3,000 B.P. (Bellwood 2005; Bellwood and Glover 2004; Higham and Thosarat 1998; Medway 1977, Veth et al. 2005).

Remains of this domesticated canid, as detailed above, recur in many burial contexts. Dog remains are also found in other contexts especially middens, suggesting that dogs may have been part of the diet of certain peoples. It has also been found that dog bones were modified for utilitarian and recreation purposes. They also often appear in prehistoric rock and cave art. A Southeast Asian example would be in the cave paintings in Thailand. In Khao Chan Ngam in the Petchabun Range, ochre paintings depict a dog nearby human individuals in hunting positions (Higham 2002). At Khao Plara in Uthai Thani Province, two human dancers holding what seems to be a type of cereal are accompanied by dogs (Srisuchat 1990).

The Molecular Genetics Dataset

In 1997, Carles Vila, Robert Wayne, Peter Savolainen and their colleagues presented contentious yet groundbreaking mitochondrial DNA analysis of 162 wolves, 5 coyotes, 12 jackals and 140 domestic dogs from different localities worldwide (Vila *et al.* 1997). The study of the mtDNA control region sequences from their samples provided ample evidence of the wolf ancestry of domestic dogs. Results reveal that all dog sequences differed from any wolf sequence by no more than 12 substitutions (in 261 base pairs of the left domain of the mtDNA control region). On the other hand, dogs differed from coyotes (*C. latrans*) and jackals (*C. aureus, C. mesomelas,* and *C. simensis*) by at least 20 substitutions and two insertions. Analysis of dog haplotypes indicates a grouping of four distinct clades, with one clade containing majority of dog haplotypes (clade I). With this data, the geneticists say that if domestication were a rare event, dog and wolf haplotypes would be mixed to a much greater extent than they are. Moreover, in computing the sequence divergence in the monophyletic dog clade I, the researchers hypothesize that dogs could have originated as early as 135,000 years ago. This date is the most controversial finding of this study and many are hesitant to accept it, especially archaeologists. The origination date may be inflated, the geneticists say, but they are convinced that the dog's origins are far older than 14,000 years. They contend that the discrepancy between divergence and the time when dogs begin to show distinct morphological differences is due to the possibility that early domestic dogs were *not* morphologically distinct from wolves. They hypothesize that distinct morphological changes may have only started to appear during the transition to sedentary agricultural societies.

The other side of the coin is defended by Morey (2005) in his defense of the archaeological burial dataset. He raises the point over the mix up between two concepts: the beginning of the actual domestic relationship as opposed to the separation of the wolf and dog genomes. Morey is right in emphasizing that these are two very distinct phenomena. The genome of wolves that were potentially ancestral to the dog gene pool may have started to diverge from other canid genomes around that 100,000 mark or earlier. But the thing to remember is that they were still wolves and not dogs. Moreover, this divergence may have been driven by reasons aside from domestication. On the other hand, the actual dog-human domestic relationship is characterized by ecological adaptations and socio-cultural processes that both humans and dogs engage in.

As shown by Vila and his colleagues' study, the dog's *lineage* may indeed be far older than 14,000 years. However, their assertion that early dogs and wolves were not morphologically distinct before 15,000/14,000 B.P. and the assumption that

morphological changes only started to appear during the transition to agriculture are rather problematic and unsubstantiated. Although we do not exactly know how humans and dogs interacted with each other in the past, perhaps the discrepancy between 100,000 and 14,000 is too great a time for such early dogs to *not* show morphological differences from their wild forebears. D. K. Belyaev's famous farm fox experiment revealed that in only 20 generations of breeding and selecting for tameness, silver foxes (*Vulpes vulpes*) already showed clear pedomorphic morphological characteristics (Trut 1999).

Wolves have been found with human remains in *Paleolithic* contexts (Olsen 1985) and even in North America at about 7,000 B.P. (Morey 2005). These remains were positively identified as wolves. Now this bit of data can point two ways. On one hand, it shows that dogs and wolves in the archaeological record are quite distinguishable from one another and so it *partially* counters the argument regarding morphological distinctness. On the other hand, it also demonstrates that wolves can be companions to humans, especially hunters and gatherers, and so in such cases, there might not have been enough selective pressures for wolves to "become" dogs.

These competing viewpoints clearly show that domestication is a complicated and thorny process. It was certainly not a one-way street. When wolf and human circles met, interacted and joined, the paths that this led to may not all have led to "doghood." These wolves/dogs living in or around the human ecological niche could have remained morphologically as wolves or in cases wherein such canids became domesticated, they may have continued to breed with their wild relatives. This last inference is supported by genetic data pointing to various backcrossing events (Vila et al. 1997). The geneticists state that such episodes of gene exchange "could have provided part of the raw material for artificial selection and the extraordinary degree of phenotypic diversity in domestic dogs"(Villa et al. 1997: 1689).

A more recent genetic finding comes from Savolainen *et al.* (2002). These researchers sought to trace the founding events of dog domestication and answer the rather ambitious questions of when, where, and how many founding events. They examined the mtDNA sequence variation among 654 domestic dogs. The results show that there are several maternal origins from the wolf (at least 5) but >95% of all sequences belong to three phylogenetic groups, which are universally represented at similar frequencies. The findings demonstrate that 71.3% of the dogs had haplotypes belonging to clade A and 95.9% belonging to clades A, B, or C. This finding indicates that the great morphological differences between current breeds worldwide are "not the result of geographically distinct domestications of the wolf" (Savolainen et al. 1611). Instead, this suggests a common

origin from a single gene pool. The authors state that due to the larger genetic variation in East Asia compared to other regions and the pattern of phylogeographic variation, the origin of the dog can be traced to East Asia ~40,000 years ago, for clade A, and ~15,000 years ago possibly for clades A, B, and C. Integrating this with the 14,000 B.P. archaeological marker, they opt for the ~15,000 marker, reasoning that in this case, the domestication event would not be an isolated one, but rather a common practice in the purported East Asian human population.

It must be noted that Stanley and John Olsen (1977) also proposed an East Asian origin for New World dogs. They based this on an observed morphological feature of the dogs that was also present in Chinese wolves (*C. lupus chanco*) but not in other subspecies of wolves. This feature is the "turned-back" apex of the coronoid process of the ascending ramus. Nonetheless, more intensive morphological and archaeological studies would be needed to fully substantiate this East Asian origin theory.

Ancient Dog Domestication in Southeast Asia

Discussions on animal domestication in current Southeast Asian literature are largely subsumed under the Austronesian dispersal discourse. Dogs, when discernible in particular archaeological contexts in both Mainland and Island Southeast Asia, are interpreted to be part of the "Neolithic package" of rice agriculture, red-slipped pottery, polished stone adzes, spindle whorls, shell ornaments, barkcloth beaters and presumed domesticated pig and bovid bones—all indicative of the movement of Austronesian-speaking peoples (Bellwood 2004, Bellwood 2005, Bellwood and Glover 2004, Higham and Thosarat 1998). However, in the case of many sites, this Neolithic complex is often incomplete, and this partiality may not only be due to the fragmentary nature of the archaeological record. Bellwood (2004, 2005) posits that the Austronesian expansion into Island Southeast Asia occurred between 4,500 to 1,000 B.P. In the Philippines (especially in the islands south of Luzon) and islands west to it, this Neolithic complex is also often partial. This, Bellwood says, is explained by the largely maritime orientation of many of the region's communities, with little focus on field agriculture or with more concentration on arboriculture (Bellwood 2005:137–9).

Critiques of and alternatives to the Austronesian dispersal hypothesis have been put forward and elaborated by many authors and shall not be discussed in great detail here. Meacham (1988, 2004) has vigorously questioned the validity of many points in the Bellwood-Blust scheme while Solheim (1988, 1996, 2002) has developed his own hypothesis centered on the ancient and highly mobile maritime

culture of the region. In between these opposing poles are authors like Bayard (1996), who weigh the pros and cons of each camp's arguments.

In the Mainland, dog remains have been found in Neolithic contexts (Higham 2002, Higham and Thosarat 1998). An example is from Khok Phanom Di (2,000–1,500 B.C.), wherein dogs began to appear in the third mortuary phase (Higham 2002). A canid was also reported in an excavation in the Chao Phraya Valley, where several *Hoabinhian* sites are located. The site is was in Ment Cave, which had a 1.6 m thick horizon of prehistoric occupation material (Higham 2002). However, in Pookajorn's (1990) initial report on the Ment Cave excavation, this find was initially represented not just as a *canid* but as *Canis familiaris*. Another interesting canid find is reported by Cranbrook (1988), who indentifies two specimens—a right lower canine and a calcaneum—as belonging to a dhole (*Cuon alpinus*). These specimens are from Agop Sarapad, Madai Caves in Sabah and the context of the remains are dated to about 10,000 B.P.

Most dog remains in the mainland are found in Bronze Age sites. A child's burial was found with an adult dog near its feet at the site of Non Nok Tha in the Khorat Plateau. In Nong Nor, near the Gulf of Siam, interring dogs' crania with humans seemed to be a regular burial practice (Higham 2002). The same may be true for Ban Lum Khao (1,400–500 B.C.). The aforementioned cave art depictions of dogs are provisionally considered to be no older than 4,000 B.P. since no convincing evidence of the dog has so far been found in Hoabinhian contexts. Higham (2002) also notes that butchering marks and evidence of charring of non-funerary specimens implies that dogs were part of the human diet.

In Island Southeast Asia, dog remains have also been unearthed in Neolithic sites, specifically in Borneo. Clutton-Brock (1959) analysed the canid finds from early Niah Cave excavations. The finds included the following: a) a left mandible of a young adult, b) a fragment of a left mandible with a canine tooth and the socket of the first premolar, and c) a right maxilla. Morphometric analysis of these bones indicates that they belonged to "very domesticated" dogs that had small and reduced structures compared to other prehistoric dogs from other regions. Measurements of the mandibular first molar from (a) strengthens this observation (Medway 1959). Even smaller are the dog remains found in Lubang Kudih (Medway 1977) and Gua Sirih (Medway 1959). The former is dated to the 13th–16th century A.D. while the latter is said to be of the 10th century AD. In Lubang Kudih, the dog, along with the pig, are exclusively represented by mandibles. Analysis of the dentition reveals that all the dogs were uniformly of a very young age. This evidence, coupled with ethnohistoric data regarding the indigenous peoples of Sarawak, led Medway to conclude that these dogs were ceremonially eaten by humans of that period.

In his short ethnography discussed earlier, Harrisson (1965) notes that the Punans of Borneo do not consider that people of the ancient past possessed dogs. In the author's words: they are said to be a "protohistorical blessing." This claim, though, is questioned by Medway (1977:25), who believes that the "undersized, dull yellowish or dun coloured dog" that is still found in longhouses and inland settlements in Borneo and Malaysia may be a descendant of an ancient type of dog that has long inhabited this region.

Veth and his colleagues (2005) also report a dog burial found in the cave site of Matja Kuru 2 in East Timor. The specimen was directly dated on bone by AMS to 2967±B.P. The authors posit that despite the introduction of agriculture and the presence of pottery and dog at around 3,000–4,000 B.P., the cave sites in this area retained their use as temporary campsites (from as early as 30,000 B.P.) for the exploitation of resources in the area.

Like the north-south expansion of agricultural societies from the Yellow and Yangzi river valleys, the domestication of dogs in SEA is also ultimately traced to the Early Neolithic of China. This would fit in with the aforesaid hypothesis of Savolainen et al. (2002). Dog remains are found in Pengtoushan (7,000–5,500 B.C.) and Peiligang (6,500–5,000 B.C.) sites (Bellwood 2005). The sites of Cishan and Bashidang are examples for the latter. Evidence of the dog is also found in Majiabang sites (7,000–5,300 B.P.) like Hemudu (Zhejiang Provincial Institute of Cultural Relics and Archaeology 2003). Southeast Asian dogs may indeed have originated from China, since *C. lupus* was not endemic to both Mainland and Island SEA. Only the wild jackal (*C. Aureus*) and the cuon (*Cuon alpinus*) were present in the Mainland. Indeed for the Philippines, there are no known endemic wild canids. Recent findings have already established that *C. lupus* was the ancestor of the domestic dog, but even in the past, morphological analysis already discounted the jackal and the cuon as ancestors of Southeast Asian dogs. Nonetheless, the reasons for the translocation of the dog may or may not have direct correlations with the expansion of Austronesian-speaking peoples or with the spread of agriculture. Other reasons could have been involved in the process of domesticating the dog in this region, reasons which are glossed over by the language-driven hypothesis. With their remote-sensing capabilities, dogs may have already been incorporated into human societies subsisting primarily on foraging and hunting, which existed prior to the onset of domestication of plants and other animals.

Dog Domestication in the Philippines

The domestic dog in the Philippines so far has a rather short and sketchy prehistory. The dog is assumed to have been translocated from other nearby

islands or from the mainland since there are no wild forms of canids from which it can evolve or which early humans could have tamed and domesticated. Alba (1994) makes a listing of mammals found in several archaeological sites in the archipelago: Sta. Ana, Manila, Butuan, and Batangas. The Sta. Ana site was excavated by Robert Fox (1977). The trenches are situated in the inner patio of the Sta. Ana church. This site was determined to be a pre-Spanish settlement dating to the 12th to 14th century A.D. Seventy-one human graves were found here, including the burial of a child beside the remains of an adult dog. In the Butuan excavations, dog remains were found in a midden layer associated with tradeware ceramics dating from c. 900–1,200 A.D. (Bautista 1991). Dog remains were also reportedly found in Lemery, Batangas, and Lal-lo, Cagayan but their temporal context has not been ascertained—they are provisionally believed to be of Neolithic date (Alba 1994).

In Pigafetta's historical accounts while in the Visayas, he mentions dogs and cats in passing (Jocano 1975). No other data regarding their possible use or significance were given in his accounts. However Alcina (1668) provides some details regarding the importance of dogs in Visayan households. Afable (1995, in Mudar 1997) documents that dogs were ritual items in ethnohistorically documented upland cultures. Coutts (1983) mentions the presence of at least two young dog specimens in the Gui-ub rockshelter excavation in Panay. The bones were found in a layer dated to 1,380 B.P. Mudar (1997) presents basic archaeological, ecological and ethnohistorical information about common wild and domestic animals in early Visayan economies. She bases her data from the comparison of four archaeological sites. However, data about the dog is also scarce. The core faunal species from these excavations are deer and pigs (Mudar 1997: 96). In the 1990 Tanjay excavation, only one dog was positively identified based on an unspecified bone fragment. Three other individual dogs were identified from the faunal remains excavated in the Sto. Nino Church of Cebu City. Mudar concludes that due to the low frequency of this taxon, the dog was not an important resource until after Spanish contact. If dogs were present and consumed in these communities, then they supposedly would appear more frequently. Indeed, the dogs may not have been part of the regular diet of these early Visayan communities. They may have served as fare for rituals and special occasions and they could certainly have been kept for reasons other than gastronomic ones.

The Ille specimen from El Nido, Palawan is still in the process of study and its context has not yet been established since the Ille prehistoric temporal sequence has yet to be defined. It is hoped though that an assessment of the context from

which the dog remains were found will help in the study of the site's temporal and spatial sequences.

Identification of the Ille Specimen

The articulated component of the specimen is composed of the cranium, mandible and cervical vertebrae (Plate 2). The rest of the postcranial fragments were unarticulated, owing to its "disturbed" matrix. Nonetheless, almost all of the postcranial elements were present and in good condition (Piper 2005, pers. comm.). It is hypothesized that these bones were disturbed in a later episode of human interment.

Prognathism of the rostrum rules out the possibility of the specimen being a felid (Plate 3). As mentioned earlier, there are no known endemic wild canids in Palawan and the rest of the archipelago. That this specimen is a dog further confirms the observation that only domestic dogs are known from the Philippines.

The mandible is relatively well preserved and so is the dentition (Plates 3–5). The dental morphology is typical of a canid, following the morphological characteristics delineated by Tedford, Taylor, and Wang (1995). The bicuspid talonid of the lower carnassial (M_1), along with the greater size of the paracone relative to the metacone in M^1 indicates that the specimen is a canid. This is also supported by the larger size of the paraconid compared to the entoconid in M_1, which in foxes are about the same size. In the dhole (*Cuon alpinus*), the entoconid is greatly reduced or even absent. What distinguishes it as a dog is the size of the carnassial, which is too small to be that of a wolf.

Another canid feature observed in the cranium was the large and bilaterally constituted proreal gyrus (Lyras and Van der Geer 2003). Other cranial features distinctive to the dog were sought but they do not appear. With the state of preservation of the specimen, the following characteristics could have been observed: a) the overhanging inion, relative to the occipital condyles (seen in lateral profile), b) the prominent sagittal crest, and c) the prominent frontal sinus. In the specimen, the inion is aligned with the condyles and both the sagittal crest and frontal sinus are not well developed. The absence of such features is attributed to the youth of the specimen.

Cranial and mandibular measurements are provided in Table 2. The teeth measurements indicate that this specimen is a relatively small dog compared to other breeds. Comparison of the carnassials with those from the Bornean assemblages studied by Medway (1977) indicates that this specimen falls into the range of the Lobang Kudih sample and is smaller than the Niah sample. Thus, like

the Kudih dog, this specimen had a foreshortened snout and reduced teeth. Tooth crowding was also observed in the right mandible.

In trying to determine the age of this dog, the dentition was first considered. The domestic dog already has the complete adult dentition soon after the age of 6 months (Cornwall 1956). The carnassials and the upper first molars have fully erupted and most of the premolars and incisors are just erupting, indicating that this dog is around the age of six months. However, the third lower mandibular molars are absent. Another area looked into is the ossification of the epiphysis of the long bones. The epiphysis of the distal and proximal end of the tibia is evidently fused, with that of the proximal end only about to be completed. The proximal end of the right femur has apparently not yet fused. Cornwall (ibid.) provides the approximate dates of fusion (see Table 3) of the epiphyses with the shafts for several domesticates such as the dog. Thus, with the proximal end of the right tibia almost completely fused and that of the proximal end of the right femur still unfused, we can estimate the *maximum* age of the dog at 18 months. However, if we go back to the dentition, it has also been noted that wear on the tooth crowns are rather negligible, indicating that perhaps this animal may not have advanced to an age too distant from six or seven months.

Context of the Ille Dog Burial

The dog remains were found in the West Mouth trench of the Ille Cave site, El Nido, Palawan Island. Archaeological research in the Palawan Island is a continuous project, and work in the Ille site started with a survey in 1998 (Paz and Ronquillo 2004). The remains were found during the 2005 season at a depth of 30–36 cm below the DP or approximately 100 cm below the surface. Unfortunately, the nature of the matrix where it was found—a shell midden and a burial ground that has seen a lot of post-depositional activity—precludes the vertical and horizontal identification of cuts. It is thus difficult to definitely establish the relationship of the dog remains with other finds in the trench. These "other finds" (Plate 1) include the following:

1. A human burial (context # 800) to the northeast of the dog remains (34–44 cm below DP);
2. A pit (context # 798) adjacent to the west wall, containing earthenware sherds, a shell spoon fragment and a small nephrite adze (44 cm below DP);
3. A line of stone slabs (context # 801) adjacent to the west wall, 10 to 15 cm above the dog's cranium;

4. Another human burial (context # 874) at the northwest quadrant of the trench, marked with stone slabs and had several grave goods like shell ornaments and stone implements (no ceramics associated); and
5. A scatter of human bones and several pig tusks (context # 782) in the northeast quadrant of the trench, which is about the same level as the dog and which is described as a probable "burial complex."

The deposition of the dog is most certainly earlier than the deposition of the stone slabs (3). It has been contemplated that these slabs may be markers for the dog's remains. However, the stones are *not* directly above the remains — the dog's head is only half-covered by one of the slabs, and the rest are not underneath them (see Plate 1). Thus, direct association between these two finds cannot be established. The pit containing a cache of artifacts (2) was deposited over one of the stone slabs and so it was most certainly created after the deposition of the latter. As such, the pit is also unassociated with the dog. The first human burial (1) also appears to be unassociated with the dog by virtue of their distance from each other and of the way the human skeleton is laid out (it is flexed and faces the east). The other human burial (4) is a separate event unto itself, but the stone slabs marking the grave may point to a same funerary practice with the dog. The scattered human bones and pig tusks (5) may represent a human burial complex that could be directly associated with the dog. Unfortunately the area where these bones were found was apparently disturbed by post-depositional activity such as later diggings and termite activity. Such taphonomic processes are also believed to be the reason why the remains of the dog were suddenly "cut"—again, articulation ends at the second thoracic vertebra and the rest of the post cranial elements are scattered near it. It is almost certainly *not* the case that the dog was eaten, as demonstrated by the articulated state of the upper skeleton. Gnawing, fracture or cut marks were not observed on the skeletal parts, especially on the vertebrae, and so this further supports the hypothesis that this burial may in fact have been a dog-human interment that was re-dug and disturbed. The dog may have been intentionally buried for ceremonial purposes, either as a ritual offering for the grave or a "companion" for the person buried. It may also be the case that the dog burial is an individual interment, and perhaps the distal elements of its skeleton were only mixed with other human bones in a later episode of digging.

Except for the stone-marked burial, all the other finds listed above may be included in a later burial phase, which is in turn part of what is provisionally called a "Ceramic Neolithic." This burial phase is primarily distinguished by the presence of pottery whereas the succeeding burial phase is characterized by the predominance of stone and shell grave goods and the lack of pottery. Included in

this succeeding phase is the burial (Context # 874) marked with stone slabs and another similar burial at the East Mouth trench. The dog seems to straddle these two phases, which is hypothesized to represent two distinct and successive funerary practices, and perhaps even chronological sequences. The clear presence or absence of pottery at the same level as the dog cannot be definitely established because of termite chambers at around the same depth. Earthenware sherds were found in these chambers, indicating that these artifacts have moved downwards. With all the human interments and the episodes of digging associated with them, many pottery sherds and bones have surely moved in different directions. It is noted though that at the level where the dog was found, pottery was noticeably becoming scarce.

These are of course tentative conclusions. Succeeding seasons of excavations will surely shed further light on the context of this find. Nonetheless, whether it is part of the "ceramic" burial phase, the succeeding phase, or an intermediary layer, the Ille dog specimen can still represent the oldest canid burial so far known in the Philippines. The fact that it was buried, possibly deliberately, in this area of frequent human interment is testament to its potential symbolic and/or social status.

Prospects and Conclusions

The dog's domestication, as has been broadly discussed, is truly a contentious and engaging issue. Prehistoric finds of dogs in different regions of the world has shed much light on the probable roles and purposes of dogs in different ancient societies. Nonetheless, scholars interested in the dog—be it archaeologists, ethologists, evolutionary biologists, paleontologists or molecular geneticists—are still piecing together the actual processes involved in its domestication. The data produced by these specialists provide different pieces of the puzzle and yet some of the data look like misfits in the whole picture. Such is currently the case for two contentious DNA studies: Vila and company's 135,000-year origination date and Savolainen and colleagues' out-of-East-Asia theory. Many still favor a "multiregional" stance for the wolf-dog evolutionary development and several authors also are quick to defend the archaeological viewpoint that the dog was originally domesticated 14,000 to 12,000 years ago. The ongoing dog genome project would certainly improve our understanding of the dog's ancestry, phylogeny and pathology.

In Southeast Asia and the Philippines, we have seen that further study is needed to unravel the origins of and processes involved in the domestication of the dog. Animal domestication in Southeast Asia is only mentioned in part in relation

to the domestication of rice and to the dispersal of Austronesian-speaking peoples. As shown in many regions, the domestication of the dog has far earlier roots than cereal domestication. Moreover, unlike other animal domesticates, dogs do not generally constitute the bulk of the meat component of the human diet and they do not have key roles, if they have at all, in plant cultivation. In the coming years, new evidence will surely help in our understanding of dog and animal domestication in this region. Nevertheless, we see once again in the Ille example a possible ritual or ceremonial significance attributed to the dog, as demonstrated by innumerable examples in archaeological sites elsewhere.

Finally, we go back to the dichotomies engendered by our efforts to understand the processes of domestication. The dog's case is really a unique case because here is an animal that seems to transcend the preconceived notion that economic function and practical utility drive the phenomena of domestication. Currently, many are starting to accept the idea that 'self-domestication' may have played a bigger role than originally thought in this canid's own evolution and domestication. From the social evolution and ecological niche hypotheses, we see a further blurring of the nature/culture divide. Still, it must be said that shedding the anthropogenic stance is ultimately a way of understanding our environment and our humanity. Perhaps in due course, a reconciliation of available data can be made and thus a better understanding of this baffling canine—which is "neither man nor beast"—can be attained.

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Abstract

The dog is the earliest known animal domesticate and is the most intensely studied animal outside of humans. Archaeology has provided varied evidence for its long prehistory, while other fields—ethology, genetics, paleontology, and others—have also greatly contributed to our understanding of this canid's evolution and domestication. In the Philippines and Southeast Asia, the presence of dogs is said to be associated with the onset and development of Neolithic cultures. A recent find of a dog's remains in Ille Cave, Palawan Island provides an avenue in which to study and reanalyze this fascinating animal's prehistory in this part of the world.

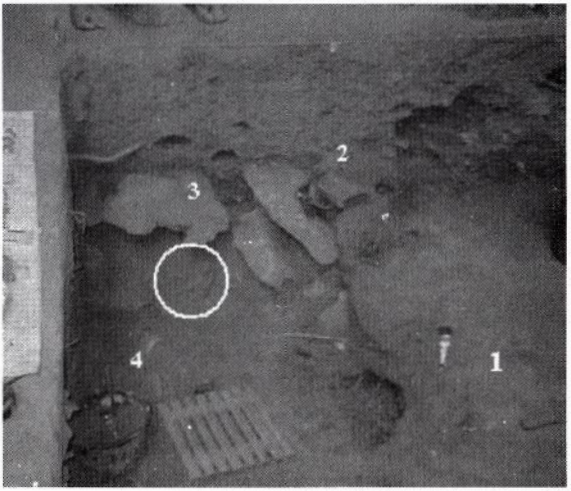

Plate 1
The context of the specimen: southwest corner of the West Mouth trench. The dog remains are encircled. Other finds in the trench include: (1) human burial (context # 800) at 34–44 cm below DP; (2) A 'pit' adjacent to the west wall, containing earthenware sherds, a shell scoop fragment and a small nephrite adze (44 cm below DP); (3) A pile of stone slabs (context # 801) adjacent to the west wall, 10 to 15 cm above the dog remains (4) a possible "human burial complex" including pig tusks and the dog remains.

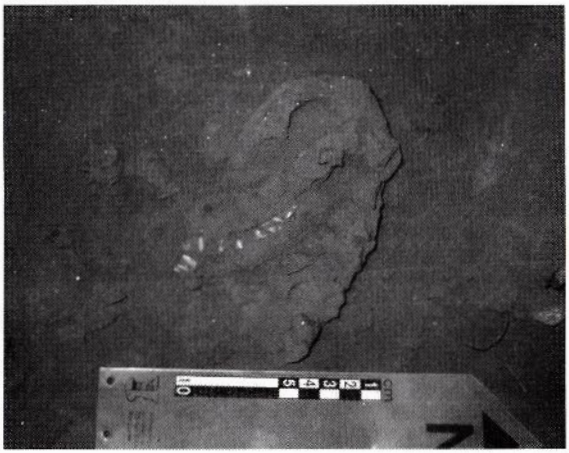

Plate 2
A closer view of the dog's cranium *in situ*

Plate 3
Lateral profile of cranium (scale in centimeters)

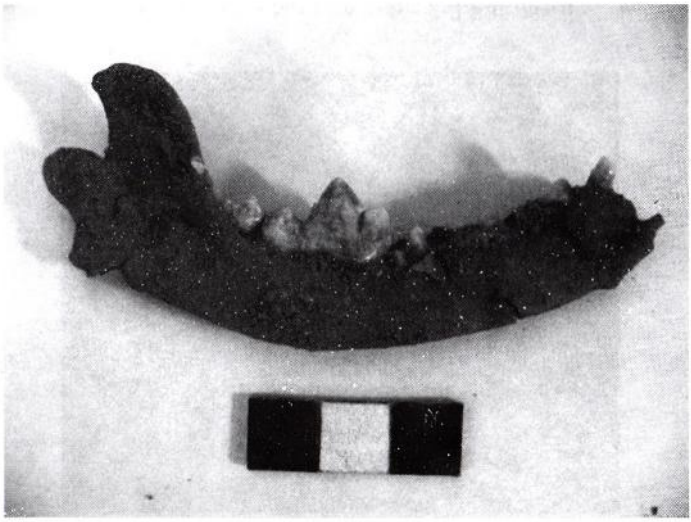

Plate 4
Buccal view of right mandible (scale in centimeters)

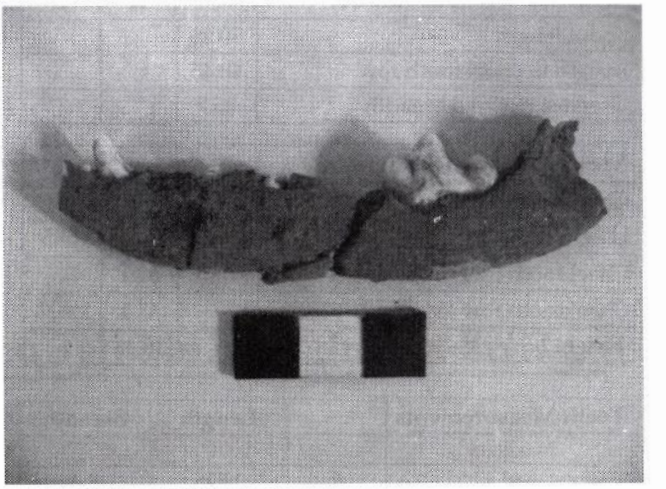

Plate 5
Buccal view of left mandible (scale in centimeters)

Site, country	Total (dogs)
Ushki-1, Siberia (ca. 10,650 B.P.)	1
Vlasac, Lepinski Vir, Yugoslavia	4
(Mesolithic: 9500-8500 B.P.)	
Ust'-Belaia, Siberia (ca. 9000 B.P.)	1
Skateholm, Sweden (ca. 7000 B.P.)	10
Botai, Kazahkstan (ca. 5650 B.P.)	35
Esbjerg, Denmark (4500-3600 B.P.)	1
Classical Greek contexts (4300-1300 B.P.)	19
Tagara, Japan (4000e2300 B.P.)	22
Chin Talidet, Sudan (Neolithic, ca. 3900-3300 B.P.)	3
Yin, China (3360-3100 B.P.)	439
Ashkelon, Israel (Persian Era, 2500-2200 B.P.)	1000+
Co^ te-d'Or (Vertault), France (ca. 2000 B.P.)	150
Duzerra Cave, Austria (500-400 B.P.)	45

Table 1
List of several Old World sites with reported dog burials (Morey 2005)

Cranial Measurements		R	L
Snout length	50.85		
Length of cheektooth row	48.45		
Greatest mastoid breadth	46.7		

Mandibular Measurments			
Greatest thickness of jaw		9.6	9.4
Height of the mandible behind M_1		14.25	14.5
Cheektooth row (M_2-P_1)		53.1	
Cheektooth row (M_2-P_2)		47.1	
Height of vertical ramus		30.45	

Teeth Measurements		Length	Breadth
Maxillary			
P^4	R	14.25	8.4
	L	14.65	8.25
M^1	R	10.6	12.6
	L	10.5	12.9
M^2	R	5.5	8.1
	L	5.45	8
Mandibular			
M_1	R	16.75	7
	L	16.55	7.1
M_2	R	6.3	5.15

Table 2
Skull (top) and Teeth (bottom) measurements (in mm) following von den Driesch (1976)

	Proximal	Distal
Humerus	12	6 - 8
Radius	6 - 8	18
Ulna	15	15
Femur	18	18
Tibia	18	14 - 15
Fibula		
Metapodials		5 - 6

Table 3
Dates of fusion of epiphyses in dogs; figures represent age in months (after Cornwall 1956)