

Dog Remains from Devon Island, N.W.T.: Archaeological and Osteological Evidence for Domestic Dog Use in the Thule Culture

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ABSTRACT. A collection of dog bones recovered from a Thule culture site at Porden Point, Devon Island, N.W.T., was found to include abundant evidence of trauma consistent with the dogs having been repeatedly struck in the facial area. The proportional representation of bones found suggests that the Porden Point dogs ultimately formed part of the diet there.

A survey of historical and ethnographic accounts of the treatment of dogs by various Inuit groups indicates that the beating of dogs to discipline them was quite common, although evidence from other sources suggests that this type of behaviour is related more to the realities of dog keeping anywhere rather than to Inuit culture in particular. The evidence concerning the use of dogs in the diet among the various Inuit groups suggests that this varied greatly.

Detailed descriptions of the types of trauma found on the Porden Point skulls are provided, in the hope that it may prove possible to identify similar evidence from earlier cultures where the nature of dog use is less certain.

Key words: dogs, Thule culture, Devon Island, archaeology, faunal osteology

RÉSUMÉ. Une collection d'os de chiens découverte à un emplacement de culture Thulé à la pointe Porden dans l'île Devon (T. du N.-O.), contenait d'abondantes preuves de traumatismes semblant toutes indiquer que les chiens avaient été frappés de façon répétée sur le devant de la tête. Les proportions des différents os qu'on a trouvés nous permettent de penser que les chiens de la pointe Porden finissaient par former une partie de l'alimentation de la population locale.

Une étude des relevés historiques et ethnographiques sur le traitement des chiens par divers groupes inuit, révèle qu'il était assez courant de battre les chiens pour les faire obéir. D'autres sources cependant nous fournissent des preuves qui laissent supposer que ce type de comportement est plus relié à la garde de chiens en tant que telle, qu'à la culture inuit en particulier. Les preuves se rattachant à l'utilisation des chiens dans l'alimentation indiquent que cette pratique variait beaucoup parmi les différents groupes inuit.

On fournit une description détaillée des types de traumatismes découverts sur les crânes de la pointe Porden, en espérant que cela permettra d'identifier des preuves similaires dans des cultures plus anciennes dans lesquelles on est moins sûr de la façon dont les chiens étaient utilisés.

Mots clés: chiens, culture Thulé, île Devon, archéologie, ostéologie de la faune

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INTRODUCTION

The importance of the domestic dog to traditional Inuit culture cannot easily be overestimated, since so many aspects of their organization for mobility and subsistence were closely tied to the use of dogs. But because of the rich historical and ethnographic data base available to researchers studying the prehistory of the Arctic, there has been a tendency to project organizational modes used by historic Inuit groups back onto some of the prehistoric inhabitants of the Arctic without a supporting body of archaeological data. This is particularly true in the case of the direct cultural and biological ancestors of the Inuit, the Thule. In an effort to improve this situation, this paper draws on recent data from Thule sites in the Canadian High Arctic and on historic and ethnographic sources to demonstrate continuity in the nature of man-dog interactions from at least Classic Thule times and to provide data and a method that should allow this relationship to be explored even farther back into the past.

HISTORIC AND ETHNOGRAPHIC ACCOUNTS

Dogs played a central role in traditional Inuit culture. For many of the regional groups they were extremely important for land transportation, pulling sleds in winter and carrying gear and food on their backs during the summer. They were also invaluable for many kinds of hunting, being used to bring to a halt and distract polar bears in particular, but also muskoxen and wounded caribou (e.g., Freuchen, 1935). For Central Eskimo groups, trained dogs were also indispensable for breathing-hole sealing,

since the snow-covered breathing holes could not be located other than by scent (Rasmussen, 1931). Given these facts, it is almost impossible to imagine traditional Inuit culture without dogs.

An Eskimo dog's life was not an easy one. Most accounts report that they generally were not fed well or often (e.g., Freuchen, 1935), and their normal activities involved some risk of injury. When pulling sleds there was always the possibility of a dog's trace becoming caught on some obstruction and the dog being run over by the sled before the driver could stop the rest of the team (Lyon, 1824). Bear hunting could be a particularly dangerous activity, and dogs often received wounds from the bear's claws, sometimes fatally (M'Clintock, 1860; Freuchen, 1935). Wolves also constituted a danger to dogs, even in camp, as Captain Lyon discovered while wintering off Melville Peninsula in 1821:

The Eskimaux had been complaining for some days of the ravages of the wolves, which, besides wounding and killing their dogs, had destroyed a sledge of skin, and torn and devoured the covering of a kayak. They had also repeatedly entered the passages into the huts, when the dogs were confined there. [Lyon, 1824:156.]

However, probably the most common cause of injury to Eskimo dogs was fighting among themselves, which, by all reports, was constant:

... The voice and long whip answer all the purposes of reins, and the dogs can be made to turn a corner as dextrously as horses, though not in such an orderly manner, since they are constantly

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fighting, and I do not recollect to have seen one receive a flogging without instantly wreaking his passion on the ears of his neighbours. [Lyon, 1824:245.]

. . . It is undeniable that cowardice is a prominent vice in the Eskimo dog. The boss of the team, the most powerful dog, which has won his position by fighting for it, enforces his superiority by making the others feel their impotence. When a stroke of the whip makes a dog howl, the boss will usually dash over, seize it by the back of the neck and bite hard, as if to help the driver to punish the delinquent. [Freuchen, 1935:162-163.]

. . . In each pack the young dogs had a distinct understanding among themselves as to rank and prowess; and if the true and understood position of an individual became disputable in the least degree, it behoved to be settled by a keen engagement, which frequently resulted in the infliction of serious wounds. Their teeth are so sharp that the wounds they leave are scarcely discernable from wounds inflicted by sharp-pointed iron weapons. [Sutherland, 1852(II):19.]

Hazards such as these were not, however, the only ones an Eskimo dog had to face. Given the obvious importance of dogs to the day-to-day life of the Inuit, it is perhaps incongruous to find that almost all historic and ethnographic accounts of the use of dogs speak of extremely severe treatment by their masters, sometimes inflicted for little or no apparent reason. The following descriptions are typical:

. . . The Esquimaux in general treat their dogs much as an unfeeling master does his slaves; that is, they take just as much care of them as their own interest is supposed to require. [Parry, 1824:520.]

. . . they were kept in order by the young boys and a girl, all of whom handled the long whip with surprising dexterity, and with as much satisfaction to themselves as torment to the dogs, which at length commenced fighting with such fury, that the head and ears of several were covered with blood. . . . One man paid exclusive attention to each sledge, in order to see that nothing fell, and also to flog the dogs, a ceremony which is seldom omitted, whether necessary or not. [Lyon, 1824:185.]

. . . In consequence, ten of them came on board, chiefly to apologize for their dogs, which had broken loose and stolen some of our fish. The poor animals had been punished accordingly, and somewhat too severely. This always appeared to us the greatest defect in the general domestic conduct of this people; and it has been equally a subject for the remarks and censures of other voyagers and travellers among these races. They derive great services from their dogs, yet never appear to love them. The animals are hardly used, and worse fed: they would be treated far worse, in every way, were it not for their indispensable utility. [Ross, 1835:378-379.]

There certainly were, however, differences among groups in the nature and severity of the treatment accorded their dogs, though the personality of the individual owner undoubtedly had a great deal to do with the likelihood of a dog being beaten. Freuchen (1935:149) reports that "A Polar Eskimo rarely beats his dogs, and then only when angered, and these Eskimos always warn one another not to hit too hard and break their spirit." Dog beating was also rare among the Mackenzie Inuit (Stefansson, 1922), while for the Copper Eskimo, Jenness (1922:240) states that:

. . . It is not often that the Eskimos strike their dogs, apart from an occasional blow to drive them out of the house; but whenever they do strike they strike hard. Inveterate fighters and trouble-breeders naturally receive the most punishment, and I have seen dogs almost mutilated with a stick. . . . Instances of cruelty do occasionally occur, but the majority of the natives are kind and

indulgent masters to their dogs, and reciprocate the affection that their dogs obviously feel for them.

ARCHAEOLOGICAL EVIDENCE

Archaeologists have long been interested in learning when domestic dogs first appeared in the Arctic and how soon they began to fill the many significant roles they played among the historic Inuit. While the accurate differentiation of dog remains from wolf remains continues to attract some attention (e.g., Morrison, 1984), this is usually not a significant problem for intact specimens, especially crania. However, the simple presence of dog bones does not provide much information about how the animals might have been integrated into the activities of their owners. Therefore, most statements on the earliest use of dog traction, for example, have been based on the occurrence of artifact types associated with it, particularly trace buckles and sled parts (e.g., Dumond, 1977).

In Alaska, dogs are first known from the Ipiutak site (Murie, 1948), but evidence for dog traction only appears late in the Thule tradition, in the Thule or possibly the earlier Birnirk phase (Ford, 1959; Dumond, 1984; Ackerman, 1984). The prehistory of the Canadian Arctic encompasses four Paleoeskimo cultures: Independence I, Pre-Dorset, Independence II and Dorset, followed by the Neoeskimo Thule culture, which gave rise to the historic Inuit. Dogs are known from Pre-Dorset (Meldgaard, 1962) but not from the succeeding early Dorset phase. Therefore, sled parts from sites of the latter phase have been interpreted as belonging to hand-drawn sleds. Dogs are, however, known from late Dorset (Maxwell, 1984) and, of course, the Thule phase.

In spite of the sketchy nature of these data, it has been suggested that domestic dogs may have been "an integral part of cultural adaptation to the Arctic, and as such will probably be shown to have had a widespread distribution in Paleoeskimo cultures" (Arnold, 1979:265). However, empirical evidence for this is as yet very meagre, and even the role played by breathing-hole sealing — and, by extension, dogs — in the earliest manifestations of the Neoeskimo Thule culture in the Canadian Arctic is not clear (Morrison, 1983; Arnold and Stimmel, 1983).

In fact, only a couple of attempts have been made to utilize evidence from dog bones from arctic sites to do more than simply state that dogs were present. In one important study, three canid vertebrae from the Lagoon site, a Paleoeskimo site on Banks Island, were found to exhibit pathological changes consistent with the animal's having done considerable pulling in harness or having carried heavy loads on its back (Arnold, 1979). And, in an unpublished faunal analysis from a Thule culture site, Andrews (1978:10) reports that:

Two domestic dog skulls show similar and interesting pathologies. Abnormal bone growth on the frontal bones directly above the orbits was noted on both skulls. It is postulated that repeated beatings of the dogs in this region of the head would do least damage to the animal, while resulting in the noted abnormality.

Arnold (1979:263) also suggests that "Canid skulls displaying cut or snapped canines and/or ossified subperiosteal hematomae due to beatings are good indicators that domestic dogs are represented, although these modifications are the result of cultural practices which are subject to variation." Unfortunately, no examples are provided and, other than the description by Andrews, no archaeological references to this kind of trauma could be found.

The Dog Remains from Porden Point

Porden Point (76°15'N, 93°40'W) is a low gravel spit located at the southeast corner of the Grinnell Peninsula, Devon Island, N.W.T. (Fig. 1). This location was utilized intensively by the Thule sometime between the 12th and 15th centuries A.D. and is dotted with 17 winter houses and over 100 other dwelling structures of various types. Three winter houses were excavated in 1976 and 1977 by Robert McGhee, of the Archaeological Survey of Canada (Park, 1983), and these produced the two skulls described by Andrews. During the summers of 1984 and 1985, the author carried out the excavation of 13 of the remaining winter houses and one small midden at sites RbJr-1, 4 and 5 and recovered additional dog remains, mostly crania and mandibles. Postcranial elements were identified as dog (as opposed to wolf) on the basis of their consistently small size. Only two canid bones from all of the excavations were identified as wolf, because they were much more robust than any of the other canid material.

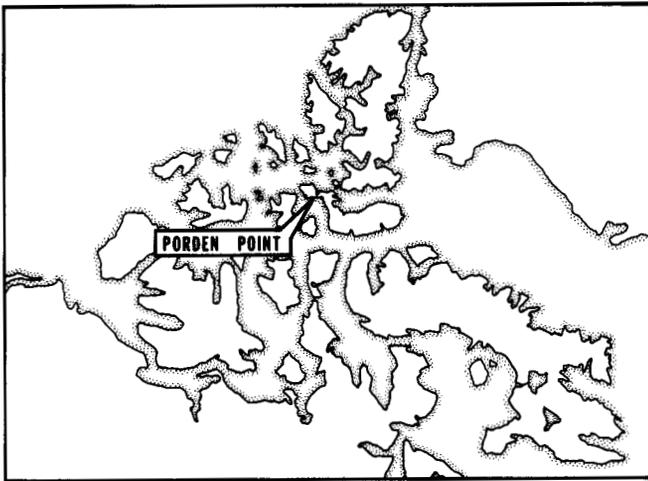


FIG. 1. Location of Porden Point in the Canadian Arctic.

Dog skulls and/or mandibles were recovered from every feature that was excavated except House 2 at RbJr-1, where the only finds consisted of four teeth. Six skulls were found essentially intact, while a further five were represented by fragments only. Several houses contained only mandibles or mandible fragments. If all of the cranial bones from the 1984 and 1985 excavations are pooled, a minimum of 16 dogs are represented. If those from each feature are considered independently, 21 dogs may be represented.

In light of Andrews's observations, the crania were examined closely. Given the unique nature of this collection, they are described in some detail. Figure 2 illustrates the osteological features of a dog's skull that are mentioned in the following descriptions.

Skull #1: This skull was only partially buried in the fill of House 1 at RbJr-1, and the top of the vault was therefore somewhat weathered. On the lateral surface of the right frontal bone there is a roughly rectangular perforation into the frontal sinus just caudal to the zygomatic process, with dimensions of 5 × 15 mm. Although the edges of this hole are weathered, the upper edge is bent inward, consistent with this being the result of a pre-mortem depressed fracture that had partially healed in this

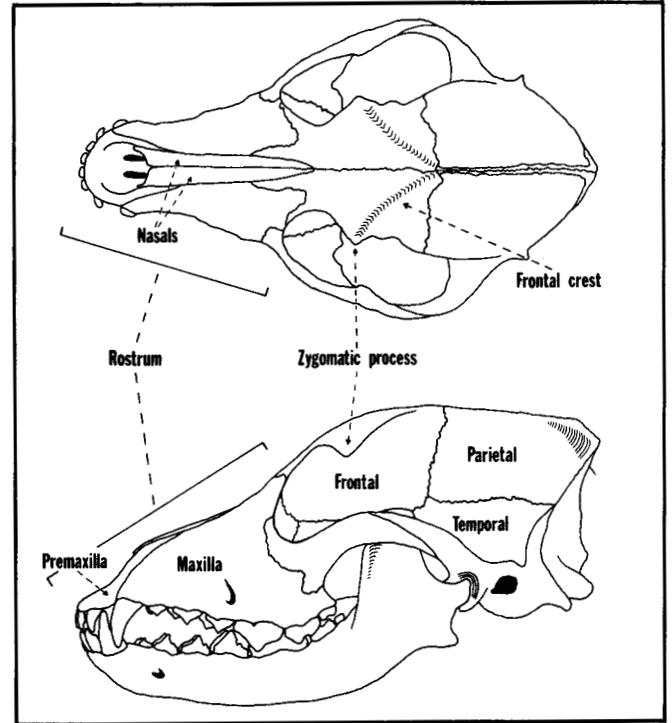


FIG. 2. Dorsal and lateral views of a dog's cranium (and mandible), illustrating the parts of the skull referred to in the text.

position. A smaller irregular perforation is present in almost the same location on the left frontal bone, in the groove between the zygomatic process and the swelling of the frontal sinus just caudal to it. This perforation into the frontal sinus has dimensions of 4 × 5 mm.

In addition, a small, partially healed fracture of the nasal process of the left premaxilla and the adjacent part of the left maxilla is present. It is semicircular in shape and has dimensions of 5 × 20 mm. A partially healed fracture of the nasal process of the right premaxilla is also present.

Skull #2 (Fig. 3): This skull from House 4 at RbJr-1 has a single circular perforation, 4.5 mm in diameter, through the dorsal surface of the left frontal bone into the frontal sinus, just medial to the zygomatic process. The outer surface of the bone surrounding the perforation has an eroded appearance.

A partially healed fracture involving the nasal process of the left premaxilla, the adjacent edge of the left maxilla and both nasal bones is present at the dorsal edge of the nasal aperture. It is roughly oval in shape, with dimensions of 14 × 29 mm.

Skull #3 (Fig. 4): This example from House 6 at RbJr-1 has a completely healed depressed fracture on the dorsal surface of the left frontal bone caudal to the frontal crest. It is oval in shape, with dimensions of 10 × 15 mm and a maximum depth of 2.5 mm.

Each frontal bone is also pierced by two perforations into the frontal sinus, one on the dorsal surface medial to the zygomatic process and the other on the temporal surface just below and behind the zygomatic process. Those on the dorsal surface are oval, with dimensions of 4 × 6 mm and 3 × 3.5 mm. The other two are irregular in shape, with dimensions of 4 × 4.5 mm and 4.5 × 9 mm.

Skull #4 (Fig. 5): This skull comes from House 1 at RbJr-4. It

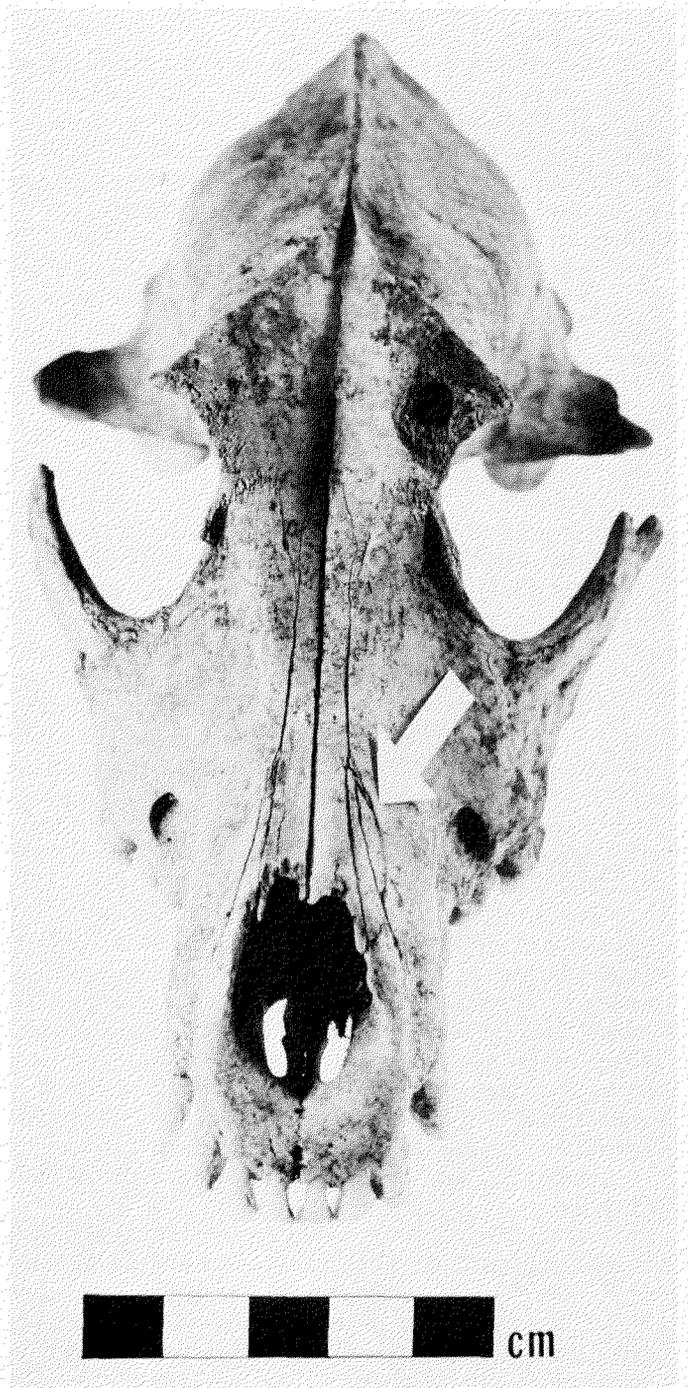


FIG. 3. Rostral view of Skull #2. The arrow points to a partially healed fracture of the left maxilla, premaxilla and nasal bones. Note also the perforation into the frontal sinus in the left frontal bone.

is missing its left temporal bone but is otherwise intact. An irregular 9×12 mm hole is present in the left frontal bone just caudal to the zygomatic process. The edges of the perforation are smooth, indicating that healing took place after the trauma occurred. The zygomatic process was apparently broken at the same time and was depressed ventrally and mesially, in which position it has healed. However, some evidence of periostitis is evident. Both nasal bones exhibit small, partially healed fractures just above the nasal aperture. Some other damage observed in this region may have occurred post-mortem.



FIG. 4. Rostro-lateral view of Skull #3. The arrow points to the healed depressed fracture in the left frontal bone. Three circular perforations into both frontal bones are also visible.

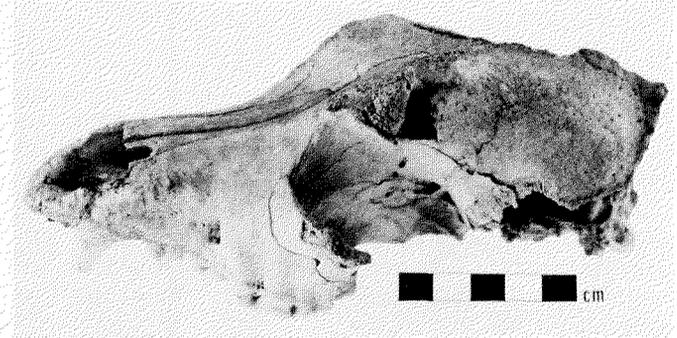


FIG. 5. Lateral view of Skull #4, showing the irregular perforation into the left frontal sinus just below and behind the zygomatic process.

Skull #5: This came from a midden scatter outside the entrance to House 2 at RbJr-5. It was only partially buried, so the top of the vault was exposed to the elements, resulting in superficial weathering. Nevertheless, the portion of both frontal bones between the zygomatic process and the frontal crest exhibits rough irregular bone growth consistent with periostitis. On the right frontal bone just lateral to the mid-point of the frontal crest there is a small, irregular perforation into the frontal sinus, approximately 3×5 mm in diameter. However, it is in the weathered part of the vault and may be post-mortem damage.

Skull #6: This skull from inside House 2 at RbJr-5 is somewhat weathered and badly damaged in the area of the frontal bones and premaxillae. At least some of this damage appears to have occurred post-mortem, making the identification of any pre-mortem abnormalities almost impossible. The only feature worthy of note is extensive alveolar resorption around the otherwise healthy teeth.

Skull Fragments: Portions of five other skulls were also found. One of these, from House 10 at RbJr-1, is a small fragment of a left premaxilla and maxilla. The other four consist only of the rostral portion of the skull (i.e., the braincase and base of each skull is missing). Two were found in House 6 at RbJr-1, while the others came from House 10 there and from House 2 at RbJr-5. Only one of these fragments, from House 6 at RbJr-1, exhibits any unusual features. Part of a healed depressed

fracture at least 2.5 mm deep is present on the broken edge of the right frontal bone at the zygomatic process.

Other Sites

The evidence of trauma observed on many of the dog skulls from Porden Point is probably typical of other Thule sites. One reason why it has not been discussed in the literature previously (except for Arnold's and Andrews's references) is the relatively small number of detailed faunal analyses from Thule sites (Stenton, 1983), while another is the often very fragmentary nature of the cranial remains found (Morrison, 1984). However, one other Thule site where similar examples of trauma have been observed on dog skulls is Peale Point (KkDo-1), at the head of Frobisher Bay. One skull from there exhibits a healed depressed fracture of the right frontal bone medial and caudal to the zygomatic process, while another, of which only the rostral portion is present, exhibits partially healed depressed fractures into both frontal sinuses and another partially healed depressed fracture on the suture between the nasal process of the left frontal bone and the left maxilla (Douglas Stenton, pers. comm. 1986).

DISCUSSION

It is apparent that much of the trauma observed on the dog skulls from Porden Point is consistent with beatings inflicted on the animals. A similar conclusion was reached for some Early Neolithic/Roman dog skulls showing damage in the facial area (Baker and Brothwell, 1980). The passages quoted above describing Inuit treatment of dogs are typical in mentioning the beatings yet at the same time providing few details. However, two sources vividly describe the type of beatings that might have produced the observed trauma:

... For the slightest offence against the restraint imposed on them the Eskimo punishes them in the most pitiless fashion. He holds the offending dog by the neck and beats him over the head with countless blows, administered with all his strength with a whipstock or some other kind of cudgel. [Hantzsch, 1977:143.]

... Poor dogs! they have a hard life of it in these regions. Even Petersen, who is generally kind and humane, seems to fancy they must have little or no feeling: one of his theories is, that you may knock an Esquimaux dog about the head with any article, however heavy, with perfect impunity to the brutes. One of us upbraided him the other day because he broke his whip-handle over the head of a dog. "That was nothing at all," he assured us: some friend of his in Greenland found he could beat his dogs over the head with a heavy hammer, — it stunned them certainly, — but by laying them with their mouths open to the wind they soon revived, got up and ran about "all right." [M'Clintock, 1860:289-290.]

Not all of the trauma observed on the Porden Point skulls can be attributed to beatings, however. The size, shape and location of the small puncture-type perforations into the frontal sinuses of skulls 1, 2, 3 and 5 do not appear consistent with being struck with a whip handle or similar implement. The best explanation that can be offered for them is that they were inflicted by the teeth of other dogs during their constant fighting, although the location of some of the perforations makes even this diagnosis somewhat unsatisfactory.

It might also be noted that one type of trauma observed ethnographically among the Polar Eskimo, the deliberate snapping off of dogs' carnassial teeth to prevent their chewing

through their traces (Freuchen, 1935), is not seen in the Porden Point collection.

A somewhat different aspect of the dog remains from Porden Point is the provenance of the cranial as opposed to postcranial bones. The excavation of the houses (excluding the single midden scatter that was excavated) produced a total of 9 dog skulls or skull fragments and 15 complete mandibles, indicating the presence of at least 15 dogs. However, a total of only 52 postcranial dog bones was found in all of these houses, as opposed to the 2625 that could be expected from 15 dogs. Thus, only about 3.5 postcranial elements per dog were recovered. A slightly higher representation of postcranial elements was found in the midden scatter outside one house, which produced 2 skulls and 16 postcranial bones, or 8 postcranial elements per dog.

It seems apparent from this that the dogs were being processed by the Thule inhabitants of Porden Point, probably for food. Almost all of the long bones are broken, perhaps for marrow extraction. It is difficult, however, to assess whether or not this means that the inhabitants of the site were under dietary stress, since over half of the skulls were found intact, and Freuchen (1935) states that the brain and tongue are the only parts of the animal not to lose palatability even when it has been starved or overworked. The fact that the dogs' heads tended to remain inside the houses is also difficult to explain. Possibly they were stored there for future consumption, but they might also represent the remains of a final meal before the abandonment of the house, when the inhabitants decided that one or more of the dogs was surplus to their transportation needs.

By way of contrast with this pattern of bone disposal, the excavation of one layer of a Thule midden at site L1Dj-1 from Cumberland Sound, Baffin Island, produced evidence of at least 34 dogs from only 144 identified dog bones. Most of the bones found were mandibles, and because of the preponderance of this element in the midden it was concluded that the dogs had been consumed as food during a period of starvation (Schledermann, 1975). And at the Walakpa site near Point Barrow, Alaska, the type of breakage in the dog skulls found there was used to suggest that the dogs had been eaten (Stanford, 1976). Whether these three somewhat different patterns of element representation and breakage indicate different types of dog utilization is not known.

Any comprehensive survey of man-dog relationships among the various historic Inuit groups is beyond the scope of this study (see Freuchen, 1935, and Jensen, 1961, for the most extensive attempts in this direction). However, in light of the condition of the dog remains from Porden Point and elsewhere, Inuit feelings concerning the killing and eating of dogs are of interest, although these varied among and perhaps within groups. The Central Eskimo generally appear to have had a strong abhorrence to this, and even to the skinning of dogs (Lyon, 1824; Birket-Smith, 1929; Freuchen, 1935), although from Martin Frobisher's voyage there is a reference to the Inuit that they encountered raising dogs to be eaten (Best, 1938). If dog skins were prepared, they could not be used for clothing or sleeping rugs (Rasmussen, 1931; Hantzsch, 1977). Apart from circumstances of starvation, most instances of dogs being killed seem to have occurred due to unusually bad behaviour on the part of the animal (e.g., Hantzsch, 1977; Sutherland, 1852). By way of contrast, the Polar Eskimo apparently liked eating dog meat, although only in winter when other food was not available (Ross, 1819). They also used dog skins for clothing, at least in the historic period (Freuchen, 1935;

Holtved, 1967). This consumption of dogs and use of their skins for clothing was also seen in North Alaska among inland Eskimo (Spencer, 1959).

CONCLUSIONS

It is evident from the type and prevalence of trauma observed on the Porden Point dog skulls (present on almost all of the skulls where the frontal bone and rostrum were found intact) that these dogs were repeatedly and forcefully struck in the facial area. The fact that in most cases healing occurred indicates that this was not done to kill or disable the animals but rather to discipline them (although those that were accidentally or deliberately killed this way may be represented by the fragmentary skulls, or may not have had their bones end up in the houses). This is quite consistent with the historic and ethnographic accounts excerpted above. However, the fact that one of the most graphic descriptions of this kind of treatment concerns a Danish resident of Greenland (Carl Petersen) and an unidentified acquaintance of his, and the discovery of apparently similar types of trauma from Early Neolithic/Roman dogs, suggests quite strongly that this type of behaviour is much more closely tied to the realities of dog keeping anywhere than to Inuit culture in particular.

The major implication of this evidence is, not surprisingly, that the general man-dog relationship seen among the historic Inuit existed at least as far back as Classic Thule times. This supports the evidence of such artifact types as trace buckles and sled parts, but also suggests that the nature of the relationship was similar, which artifacts cannot do entirely satisfactorily.

Ideally, it may prove possible to find this type of trauma on dog or dog/wolf remains from earlier cultures where the status of dog use is much less well known. The fact that trauma of this kind can be identified on fragmentary cranial remains may make it particularly valuable in more typical archaeological situations where skull bones are highly comminuted. Unfortunately, its presence cannot really help answer the question of what specific activities the dogs were being kept for.

One other possible implication relates to the evidence that the dogs were used for food by the inhabitants of the sites. The ethnographic accounts referred to above suggest that the eating of dogs was most common and accepted among the Polar Eskimo and that dogs were used by them as a winter food resource. This may indicate that the Thule who occupied Porden Point had closer ties to the north and west than to the groups to the south, who developed into the Central Eskimo. Conversely, it may simply indicate that the eating of dogs, even when starvation did not necessitate it, was a common Thule practice, later modified in many areas. The nature and rate of the development of the historically known regional Inuit groups from a Thule base is still not understood in any great detail, but evidence such as this may, with extensive corroboration, indicate that their origins can be found quite early in the Thule phase.

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