Chapter 10

The Cultural Significance of Domestic Dogs in Prehistoric Keatley Creek Society

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Introduction

Dog remains are remarkably common in some Keatley Creek housepits. Because dogs play important economic and social roles in some traditional cultures, it was important to try to identify their roles in the prehistoric Keatley Creek community. It was hoped that an in depth analysis of dog remains at the site would contribute significant new information to our understanding of socioeconomic organization at the site.

Dogs were probably the first species to be domesticated by humans, and, in Canada, they were the only domestic animal in prehistoric times. Their roles in society likely included use as food, clothing, protection, status items, and hunting and transportation aides, as well as being part of myth and ritual (Driver 1976). Canid remains are present on the Plateau in all three late prehistoric horizons (Richards and Rousseau 1987), including some in human burial contexts (Smith 1900; Sanger 1968; Pokotylo et al. 1987; Langemann 1987). The initial appearance of dogs at the Baker Site (ca. 4,500 BP) is evidence of early exploitation of dogs on the Plateau and probably coincided with the beginning of a seasonally sedentary lifestyle, when resource surpluses were available to support these domestic animals. Very few interpretations exist, however, concerning the significance of domestic dogs in Plateau prehistory despite the ethnographic information and archaeological evidence available. In addition, there are few published analyses of behaviorally induced or culturally produced skeletal pathologies in domestic dogs.

In an attempt to remedy the present interpretive void, this study will use the available information to consider existing hypotheses, as well as to develop new hypotheses, concerning the cultural significance of domestic dogs for the residents of Keatley Creek. These hypotheses will be evaluated using data obtained from an osteological analysis of all canid remains found on the site. Where appropriate, ethnographic information and data from other archaeological sites will be incorporated into the discussion. It is hoped that this approach will lead to a meaningful reconstruction of the human and animal behaviors responsible for formation of the assemblage.

Context and Analysis

Canid remains were recovered from four housepits at the site: HP's 3 (HP 3) and 7 (HP 7), which were completely excavated, and in HP's 109 (HP 109) and 110 (HP 110), where bones were recovered from test trenches across the diameter of the cultural depressions. Dog remains are discussed with reference to their contexts and the osteological analysis. The goals of this analysis were to determine the physical function, specific treatment, health status, age at death, cause of death, and sex of each individual. In some instances it was not possible to identify individual animals; in these cases, associated or articulated elements are treated as a unit.

Housepit 3

This was a medium-sized dwelling in the central village core. Artifacts and features within the house were concentrated in the periphery, the central area being clear (Vol. II, Chap. 1; Vol. III, Chap. 6). Most of the faunal remains recovered were found around a pit feature, designated 89-P2, that was used by the latest occupants; three projectile points found in the pit, known to date to the Kamloops Horizon (1,200–200 BP), support this scenario. A number of artifacts regarded as status items have also been found in HP 3, suggesting a fairly wealthy household (Vol. II, Chap. 13). The partial post-cranial remains of a juvenile canid (Dog 1) were found in the central area of the floor. It could not be determined whether the animal had been deliberately placed or had died there after the dwelling was abandoned (Vol. III, Chap. 6). No other canid remains were found in this housepit.

Dog 1

This individual is represented by a total of 48 elements. These remains were highly fragmented, with the skull, many forelimb elements, and most vertebrae and ribs missing; the hindlimbs, however, were still in the articulated position. Elements present, included the left humerus and distal left radius, left femur and tibia, fragmented right tibia, portions of both scapulae, and parts of the pelvic girdle. Many foot elements were also present: left and right calcaneus and talus, six metacarpals, eight metatarsals, and seven proximal phalanges. Eleven fragments less than 2 cm in size could not be identified to element. No epiphyseal union had occurred on any of the bones, suggesting an age of less than five months (Getty 1975). The small size of the bone elements brings this estimate closer to two to three months. Owing to the young age of this animal, its sex could not be determined. There was no evidence of burning or stone tool cutmarks on any of the elements. It appears, however, that the skeleton had been scavenged extensively: many elements were missing, and most of those present showed signs of gnawing and tooth puncture marks.

Housepit 7

Housepit 7 was one of the largest housepits at the site and was located in the eastern area of the village core. Both artifact (Vol. I, Chap. 13; Vol. II, Chap. 11) and faunal clusters (Vol. II, Chap. 7) suggest that three or four extended domestic household areas were present in this dwelling. It appears that this housepit was occupied, probably intermittently, for over 1,500 years (Hayden and Spafford 1993). This housepit contained more canid remains than any other dwelling excavated at Keatley Creek. Like HP 3, the central section of this dwelling was free of features; a single dog cranium was found in this area lying directly on the floor. Large storage pits and hearths were all located on the west side of the dwelling. Two of these pits, designated 88-P31 and 89-P5 for the year and order in which they were found, contained numerous canid remains, including one complete and articulated individual. Like most of the other storage pits, these underlie and predate existing floor deposits. The single cranium will be described first, followed next by the context and contents of Storage Pit 88-P31, and then Pit 89-P5.

Cranium 1

This specimen was recovered in very poor condition: many elements of the cranium were missing and those present were damaged. Full dental eruption had occurred and, along with heavy wear on the teeth, implies that this individual was an older adult. Two premolars had been lost, an event that occurred while the animal was still alive, as evidenced by alveolar resorption. The two upper canines were broken and, because this condition recurred in some other dogs, probably represented intentional human breakage, as has been recorded in the Arctic (Freuchen 1935). Of the anterior teeth, only one left incisor was present.

Storage Pit 88-P31

The dimensions of this pit were approximately 135 cm in diameter, by 115 cm deep. A birch bark lining was unearthed at 62 cm below surface, and canid remains were encountered at 90 cm. One complete dog skeleton, still in the fully articulated position, appeared to have been tossed in the pit, given its vertical orientation. One skull lay nearly nose to nose with that of the above individual, and two others, along with some fragmentary post-cranial elements, were found directly beneath it (Fig. 1). Post-cranial elements as a group, though, were largely lacking from this feature. Direct dating of one dog from this pit resulted in an age of 2,160 ± 60 BP, placing it within the Plateau Horizon (2,400–1,200 BP) (Vol. I, Chap. 2). This pit also contained fire cracked rock, lithic flakes, coprolites, and other faunal remains associated with the canid bones. An MNI (Minimum Number of Individuals) of five dogs has been established for Storage Pit 88-P31 based on the four skulls recovered and associated whole elements. The NISP (Number of Identified Specimens) for these four dogs is 293. Each of these animals will now be discussed, in turn, beginning with the complete individual.

Figure 1. Articulated individual and other canid remains at the bottom of pit feature 88-P31.

Dog 1

Dog 1 from Pit 88-P31 was the only fully articulated individual recovered from Keatley Creek. The skull was uncovered in a damaged state, with some fragile elements missing. A notable feature of this skull was a grossly enlarged occipital protuberance, resulting from extensive exostosis (bony outgrowth). This feature was more pronounced on the left side and was likely caused by long-term, localized mechanical stress. A number of partially healed fractures were evident on the cranium. The mandibles were also found in a fragmented condition. Cranial teeth were extremely worn, and a few were lost during the individual's lifetime, as evidenced by alveolar resorption. One canine and molar had been broken and there was some evidence of tooth caries, which are four times more prevalent in domestic than in wild canids (Baker and Brothwell 1980:146).

The spinal column was in a much better state of preservation than the skull or mandibles and exhibited a number of abnormalities. Dorsal curvature was evident on the left wing of the axis vertebra and was probably associated with the exostosis of the left occipital. The cervical vertebrae exhibited reinforced muscle attachments, while the spinal process of the 1st thoracic vertebra was significantly enlarged and leaned caudally; this is abnormal, as it should be either vertical or leaning towards the cranium (Fig. 2; Miller 1964:49,51). A pronounced flattening of the spinal process was evident on the 2nd thoracic vertebra, and must have been produced by excessive pressure from above. Flattening of the spinal processes was also evident on the 3rd to 9th thoracic vertebrae, which were additionally deformed and sculptured by exostosis at the tips. The 10th and 11th thoracic vertebrae were the most affected in this way, having been completely fused at the neural arches. The spinal process was broken off of the 12th thoracic, but the flattening pattern was again evident on the 13th. The spinal processes of the last thoracic and 1st lumbar vertebrae had fused together. It is possible that these points came into contact, became infected as a result, and then healed under stress. Remodeling of the rib articular facets was apparent on all thoracic vertebrae, particularly the 9th, 10th, 11th, and 12th vertebrae, which exhibited osteophyte formation in this area. This type of alteration may indicate that an animal was overworked, or had been put to work too young (Siegel 1976:362). Evidence for stress, however, was much more noticeable on the first four lumbar vertebrae than on any of the thoracic vertebrae; the spinal processes of one of these elements was completely table-topped in appearance (Fig. 3). The 5th to 7th lumbar vertebrae appeared normal, but there was evidence for bone necrosis on the sacrum; this could have been caused by osteomyelitis or osteoperiostitis (Baker and Brothwell 1980:63). Infection was also evident on the 1st caudal

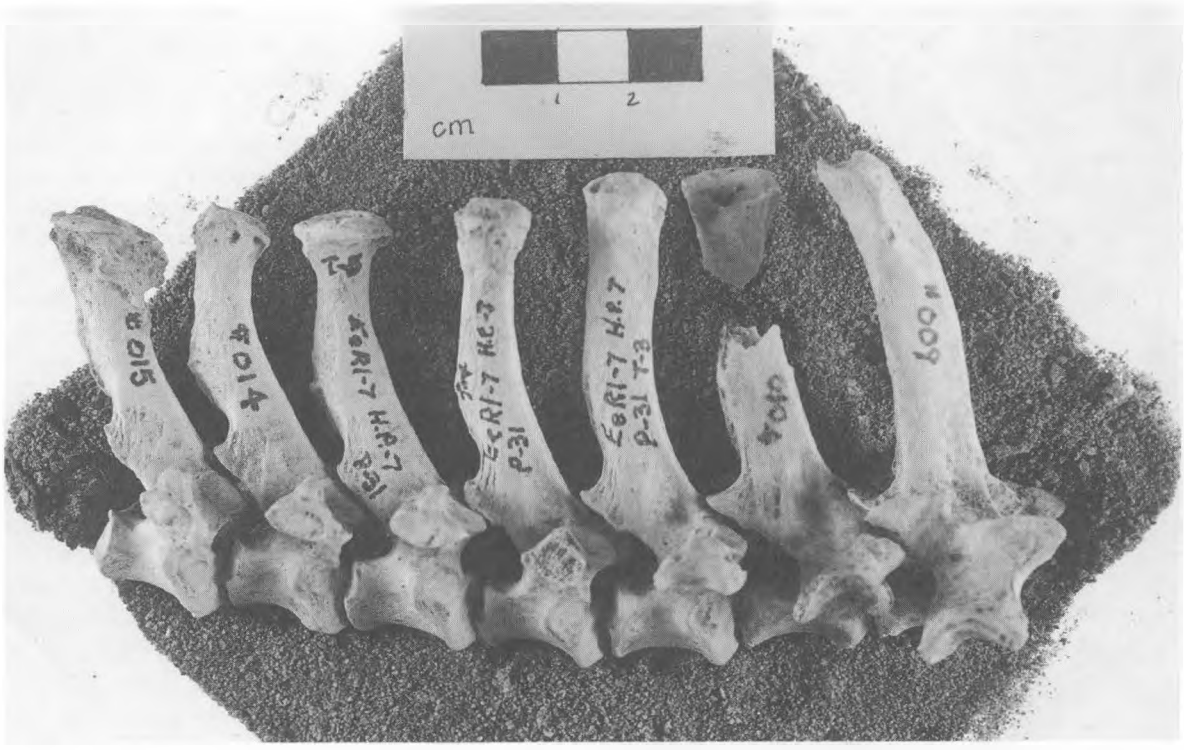


Figure 2. Thoracic vertebrae of Dog 1 showing the spinal process of the first element leaning caudally instead of towards the cranium.

vertebra, but the rest appeared unaffected. The entire vertebral column seemed to have undergone significant and constant pressure from above; this probably began at a young age while the spinal processes were still growing.

All of the ribs were present, but not complete. Healed fractures were visible on the shafts of the left 4th and right 9th ribs, and active infection was present in fresh fractures of the left 6th and 7th ribs. The sternum, though, was completely normal in appearance.

Evidence of stress deformation and pronounced muscle attachments were present on the left scapula; the right scapula was similarly affected, but to a lesser degree. Evidence of bone infection was apparent on the right element and resembles either osteomyelitis or osteosarcoma. Osteosarcomas are common in older individuals of large dog breeds, and probably result from excessive weight stress (Baker and Brothwell 1980:100). Additionally, these types of infection are common on flat bones, such as the scapula, and usually occur in the same areas as on this specimen (Siegel 1976:361). Stress related abnormalities were also exhibited on the front forelimbs of Dog 1, with pronounced muscle attachments on both humeri, and on the left and right radius and ulna. In all cases, these features were more prominent on the left elements. The left 3rd metacarpal was similarly affected.

Well-defined muscle attachments were also present on the pelvic girdle and both femora and tibiae. Lesions were evident on the right femur and both tibiae; these conform to the criteria outlined for osteosarcoma (Baker and Brothwell 1980:99–100). Aside from the lesions, no abnormalities were present on the hindlimb longbone elements. This was not the case, however, for the left hind foot. Improper healing of a fracture on the distal end of the 5th metatarsal had led to displacement of the articular facet, which subsequently reconnected off-center; the corresponding phalanx had, as a result, become flared at the articulating end. In addition to this problem, the 2nd metatarsal and proximal phalanx of the left foot displayed osteoarthritic symptoms (Baker and Brothwell 1980:115). It may be that the 2nd metatarsal and phalanx counteracted the injured 5th elements and the noted pathological changes resulted from their increased use. This hind foot injury may also explain why most of the skeletal alterations were more pronounced on the dog's left side; the left forelimb likely took on an increased stress load as it compensated for the injured hindlimb.

These types of osteoarthritic symptoms usually do not occur in dogs of less than 6–8 years (Baker and Brothwell 1980:99); this, in combination with the well-worn teeth of the individual, suggested that it was an older animal. The presence of the os-penis bone made it possible to identify Dog 1 as male. This particular canid was comparable in size and robusticity to the wolf *(Canis lupus)*. With a femur length of 160 mm, this individual had a stature similar to those in the Wildcat Canyon, Oregon canid assemblage, which exhibited a mean femur length of 162 mm (Dumond 1983).

Dog 2

Dog 2 was represented by a gracile cranium and matching slightly fragmented mandibles (NISP = 7). Using criteria established by Onodera et al. (1987), this animal was identified as female. Numerous abnormalities were evident on the skull. A tooth puncture near the right orbit showed a sharp break with no subsequent healing, suggesting it was a post-mortem event. Both left and right zygomatic arches were missing and there was a furrowed mark across the right occipital condyloid process. A fracture immediately above the right 4th maxillary premolar appeared to have become infected while healing. In the right mandible, the 4th premolar was broken and exhibited subsequent wear. It is possible that the same impact produced both of these fractures and that the infection in the maxilla gained access through the exposed pulp chamber of the premolar. Two incisors and the 1st and 2nd premolars were absent from the right maxilla. The remainder of the teeth were present and showed little wear, suggesting a fairly young age for this animal. A recently fused femur epiphysis was found in the pit and probably belonged to this animal. Fusion occurs at around 18 months of age (Schmid 1972), and provides a relative age for Dog 2.

Figure 3. Lumbar vertebra 1 from Dog 1 88-P31 showing the severity of the flattening producing a table-top appearance.

Dog 3

Dog 3 was represented by the skull, both mandibles, and the axis and atlas vertebrae. Portions of the zygomatic arches, frontals, and lacrimals were missing. Cranial criteria (Onodera et al. 1987) suggested that this animal was male. There was a tooth indentation on the right maxilla and the atlas and axis vertebrae showed signs of extensive gnawing. Gnawing was similarly evident on the right mandible, and indications of periodontal disease were present on the left mandible. All teeth had erupted and exhibited little wear, suggesting an age of approximately 1 year. A left calcaneus in the process of fusing, which occurs at around 14–15 months (Schmid 1972:75; Getty 1975: 1451), and an unfused femur, less than 18 months, recovered from the pit probably belonged to this animal. With the inclusion of these elements, the NISP for this individual is 9.

Dog 4

Dog 4 was the youngest dog recovered from the pit and was represented by only the frontal portion of a skull, a right mandible, and a number of bone fragments (NISP = 89). All teeth anterior to the carnassials were not fully erupted, indicating an age of 4–5 months (Schmid 1972); the teeth in the right mandible were at a similar stage of eruption. All the bone fragments were identified to element and their unfused state suggests an age of 5–6 months. A lesion below the mandibular 1st molar, resembling osteoperiostitis (Baker and Brothwell 1980:68–74; Siegel 1976:368), is evidence of poor health.

Signs of carnivore scavenging were evident in addition to the highly fragmented nature of the bone elements; no post-cranial elements were identified, and the skull, ischium, and radius were gnawed. Two fragments also exhibited signs of gastric etching, suggesting that they had previously been consumed.

Dog 5

A number of elements (NISP = 42) identified in the pit were determined to be unrelated to the four skulls and these likely represent a fifth dog. These fully mature elements included cranial fragments and some teeth, plus a number of whole bones. Tooth punctures and crushed, crenulated edges were present on the distal right femur and right calcaneus fragments, and

gnawing was apparent on many of the broken elements. No cutmarks or signs of burning were present. The lower left and upper right canines were both broken and show subsequent wear. Considerable wear on the other teeth, in combination with the fully mature elements, suggests an age of approximately 2 years. Due to the absence of an intact cranium or an os-penis, the sex of this dog could not be determined.

Miscellaneous Remains

Many fragments (NISP = 66) were identified to element and could belong to any of the mature dogs, except Dog 1, which was complete; half of these were from the foot or paw. In addition to these, 127 fragments were not identified to element but were probably canid given their size. Signs of gnawing and gastric etching were present on many of these fragments.

Storage Pit 89-P5

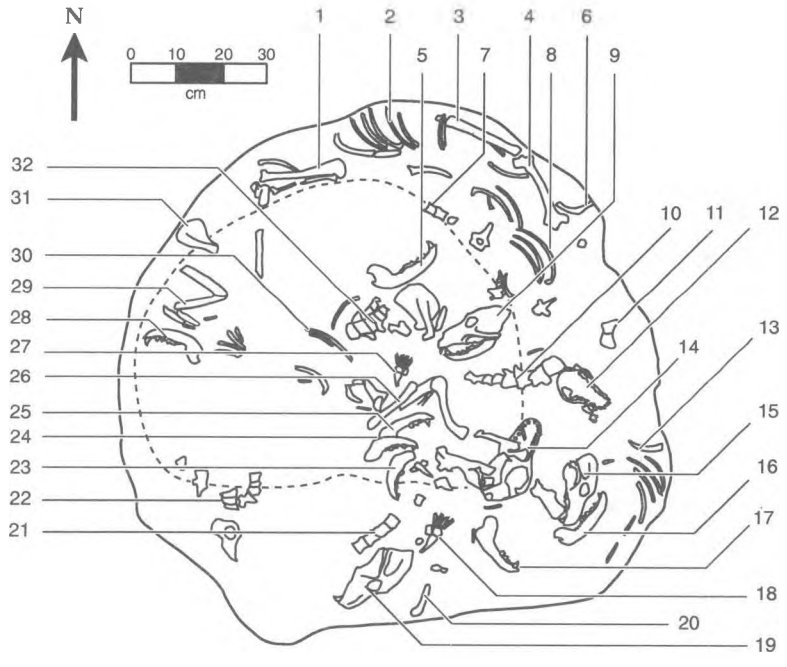
This feature was of a similar size to Storage Pit 88-P31 with a diameter of 101 cm and a depth of 130 cm, and was located immediately next to it. At 105 cm below surface a skull, two mandibles, a partial forelimb, and a group of ribs were encountered. In addition, numerous canid remains lay scattered at the bottom of the pit within a 20 cm cultural deposit (Fig. 4). A few elements were still in their articulated positions, although most were not. These bones were identified to element, while the fragmentary nature of some precluded this assessment. Fire cracked rock, charcoal, lithic flakes, coprolites, and uncommon faunal remains were also present in the pit, which appeared to represent a single, large dumping event (Vol. III, Chap. 4). An associated Plateau style projectile point may date this event. Archaeological evidence suggests that storage pits were quickly filled in when no longer being used (Vol. I, Chap. 10); this may have occurred each fall when pithouses became re-inhabited. Since the deposits overlying the canid remains resembled refuse from floor cleaning activities, it at first appeared that the remains were also considered to be garbage. The dog bones at the bottom of the pit, however, occurred in a light soil matrix with few other cultural inclusions. Those remains found in an articulated position in the pit that could not be confidently attributed to any one individual are treated as discrete units. They are summarized in Table 1. Identified individuals will be dealt with first.

Dog 1

Dog 1 (NISP = 18) was represented by a skull, mandibles, atlas vertebra, and numerous cranial fragments. All teeth were present in the maxilla, while the mandibles, which were fragmented as a result of poor preservation, were missing two incisors and two left premolars. Lack of a well-defined saggital crest and other cranial features (Onodera et al. 1987) suggests that this animal was female. All teeth had fully erupted and were slightly worn, indicating she was of adult age.

Dog 2

A complete skull in excellent condition, with features indicating it belonged to a male (Onodera et al. 1987), two mandibles, and an atlas vertebra were assigned to this dog (NISP = 4). A depressed fracture was evident on the right frontal (Fig. 5). This injury likely happened while the bone was still soft and may have led to the death of this animal. The right zygomatic arch was also fractured, but had partially healed. A



1	Hind Limb #1	12	Cranium #4	23	Mandible #4
2	Ribs #2	13	Ribs #5	24	Mandible #3
3	Tibia #2	14	Cranium #2	25	Mandible #6
4	Femur #2	15	Cranium #3	26	Forelimb #1
5	Mandible #2	16	Mandible #1	27	Foot #1
6	Illium #2	17	Mandible #8	28	Mandible #5
7	Vert.Col. #3	18	Foot #2	29	Forelimb #2
8	Ribs #3	19	Cranium #1	30	Ribs #1
9	Cranium #5	20	Humerus	31	Scapula #1
10	Vert.Col #1	21	Vert.Col #6	32	Vert.Col #2
11	Vert. Col #5	22	Vert. Col #4	- - -	Limit of Pit Opening

Figure 4. Distribution of Canid remains on bottom of pit feature 89-P5 (taken from field drawing).

well-defined occipital protuberance shows signs of excess bone proliferation, while the occipital and saggital crests appear normal. The left 3rd premolar was missing from the maxilla and the 1st premolar had erupted on the right side only. Both mandibles were complete, although missing three incisors, and the 1st premolars had not yet erupted. Breakage and subsequent wear were evident on the left canine. Wings on both sides of the atlas vertebra were broken off and appear to have been chewed while still fresh.

Dog 3

Dog 3 was represented by a fragmentary skull and the atlas vertebra (NISP = 7). The cranium, which was smaller than that of Dog 1 or 2, was missing the right sphenoid and both temporal bones, while both mandibles were slightly damaged and gracile in appearance. All maxillary teeth were present except the right 1st premolar. The lower incisors, left 2nd premolar, and right 1st and 2nd premolars were missing, while the left 1st premolar had not yet erupted. Holes, gouges, and furrow marks were present on the mandibles, indicating probable carnivore gnawing. Cranial traits, including lack of a saggital crest (Onodera et al. 1987) suggest that this canid was female; the nearly fully erupted dentition was slightly worn, indicating that she was a young animal. Both wings of the atlas vertebra were broken and were chewed in a manner similar to Dog 2.

Dog 4

Only the palate and tooth bearing portions of this individual's cranium, along with both mandibles, were present (NISP = 3). The left fourth and right third premolars were missing, while enlarged first premolars had replaced the second premolars, which were absent. Both mandibles were complete, except for the ascending rami, which were chewed off. All teeth had erupted but exhibited little wear, suggesting an age of no older than a year. The sex of this dog could not be determined, as most of the cranium was missing.

Dog 5

A nearly complete skull with a reconstructed left zygomatic arch represents the fifth canid (NISP = 7) from this storage pit. Notable on this cranium is an occipital protuberance, which was significantly defined by bone proliferation, and the saggital crest, that had a roughened appearance and had folded at its junction with the frontals. These features probably resulted from stresses similar to those encountered by the fully articulated animal of Storage Pit 88-P31. In the maxilla, the right 3rd molar and both 1st premolars were missing, while the left 1st molar had been broken during the animal's life and was surrounded by evidence of periodontal disease. The left mandible was complete, but missing the 3rd molar, while the right mandible was fragmentary and missing a 1st premolar

Figure 5. Depressed fracture on right frontal bone of Dog 2 89-P5 cranium.

and all molars. All teeth were fully erupted and well worn, indicating advanced age, and, along with cranial traits and a marked saggital crest, suggest that Dog 5 was an older male animal.

Articulated Post-cranial Remains from Storage Pit 89-P5

A number of articulated elements units were present in the pit that could not be confidently associated with a specific individual; these are summarized below (Table 1). Many features were evident on these units that parallel those of the identified individuals. Most notable were the signs of skeletal stress: three incidences of spinal process alteration, two occurrences of pronounced muscle attachments, two bone infections, one healed fracture, and a case of arthritis. A common characteristic shared by the majority of these units and the miscellaneous fragments was the high degree of carnivore scavenging, including evidence of gnawing and gastric etching.

Housepit 109

This structure was located outside of the central village core and has been interpreted as a possible special function structure during at least the earliest occupation (Vol. III, Chap. 11) The last occupation of the house probably occurred during the Kamloops Horizon (1,200–200 BP), when the structure was likely a mat lodge dwelling. Canid remains were encountered in this later deposit, wrapped in birch bark and associated with a hearth and food remains. It is possible that additional canid remains are present in this housepit, as it was not fully excavated. The remains consisted of only a portion of the lower axial skeleton, including the sacrum, four articulated vertebrae, and vertebral fragments. The sacrum had been wrapped or covered in birch bark and possibly protected by an overlying cobble. Bark was also found under the vertebrae and had been burnt (Vol. III, Chap. 11). The bones had been blackened, although it was unclear whether this was a result of burning or staining by the highly organic soil matrix. If burnt, the temperature could not have been very high, as the bark survived. A collapsed and burnt roof is the likely source of the charcoal rich sediments.

Dog 1

These articulated canid remains (NISP = 9) consist of a sacrum, four lumbar vertebrae (3rd, 4th, 6th, and 7th), one thoracic vertebra, a spinal process and neural arch of a second thoracic vertebra, and one other vertebral fragment, possibly a lumbar. The sacrum and 6th and 7th lumbar vertebrae were unburnt, while the 3rd and 4th lumbar vertebrae and vertebral fragment were burnt black. It is possible that the presence of flesh protected the rear elements from the heat. In addition to the

Table 1. Summary of 89-P5 Post-cranial Remains

Unit	Elements
Vertebral Column 1	2nd, 3rd, 4th, 5th, and 6th Cervical
Vertebral Column 2	11th and 12th Thoracic; 1st, 2nd, and 3rd Lumbar
Vertebral Column 3	2nd Cervical; 7th and 8th Thoracic
Vertebral Column 4	4th, 5th, and 6th Lumbar; Sacrum
Vertebral Column 5	4th, 5th, and 9th Thoracic
Vertebral Column 6	8th, 9th, and 10th Thoracic
Vertebral Column 7	7th Cervical; 1st, 2nd, 3rd, and 9th Thoracic
Ribs 1	5th, 8th, and ? Left; 9th Right
Ribs 2	9th and 10th Left; 3rd, 4th, 8th, 10th, and 11th Right
Ribs 3	2nd, 3rd, 4th, 5th, 6th, and 7th Left; 5th and 6th Right
Ribs 4	1st, 2nd, 11th, and 12th Left; 1st, 2nd, 3rd, 8th, 9th, and 10th Right
Ribs 5	4th, 9th, 10th, and 11th Right
Forelimb 1 (Left)	Scapula, Humerus, Ulna, Radius, 6 Carpals, 5 Metacarpals, 3 Phalanges, and 1 Sesamoid
Forelimb 2 (Left)	Scapula, Humerus, Ulna, Radius, 7 Carpals, 5 Metacarpals, 3 Phalanges, and 1 Sesamoid
Forelimb 3 (Left)	Ulna, Radius, 6 Carpals, 5 Metacarpals, 3 Phalanges, and 1 Sesamoid
Hindlimb 1 (Left)	Tibia, Fibula, Calcaneus, Talus, and 4 Metatarsals
Hindlimb 2 (Left)	Pelvis, Femur, Tibia, and Fibula
Forefoot 1 (Left)	3 Metacarpals and 1 Phalanx
Forefoot 2 (Right)	5 Metacarpals, 3 Phalanges, and 1 Sesamoid
Hindfoot 1 (Left)	Talus, 1 Tarsal, 4 Metatarsals, 3 Phalanges, and 1 Sesamoid
Miscellaneous	303 Unassigned Elements and 291 Unidentifiable Fragments

articulated elements, 35 fragments less than 3 cm were present and appeared to have been naturally broken; of these, eight showed signs of extensive burning. All vertebral plates had fused, suggesting that this individual was a mature adult. The absence of a cranium or os-penis precluded the identification of its sex.

Housepit 110

Located on the periphery of the site, this housepit showed evidence of four occupations, including one with a hearth and storage pit. Plateau Horizon (2,400–1,200 BP) projectile points were present during all occupations, which are represented by thick cultural deposits, suggesting long term, but episodic periods of habitation (Vol. III, Chap. 11). In the lowest cultural layer, beneath the hearth and above sterile soil, were the burnt and partially articulated remains of a small canid. This area had been fire-reddened and was surrounded by burnt fish and mammal bone. No canid remains were found in the other levels, but were likely present beyond the test trench, as the atlas and axis vertebrae were recovered from the trench wall. It appears that initial roof collapse, followed by trampling and compaction during later occupations had dispersed the remains. High heat during burning had caused discoloration and cracking of the bones; this degree of alteration suggests that little flesh could have remained during burning. A lack of fire-reddened sediment below the dog does not support the idea that the fire was present on the floor.

Dog 1

The recovered remains represent a highly fragmented, but nearly complete and partially articulated individual (NISP = 52). Two mandibles and two cervical vertebrae were the only elements over 4 cm in size. All bones had been burnt but exhibit differing degrees of heat modification. Ten teeth were recovered, including eight from the mandibles and both upper canines; these were all loose and fragmentary, burnt, and slightly worn. The axis vertebra posterior was unfused, while the anterior cervical vertebrae were in the process of fusing, an event that occurs at approximately 20 months of age (Schmid 1972). Thirteen occipital fragments were the only cranial elements recovered; this lack of cranial remains along with the absence of an os-penis means that sex could not be determined.

Additional Evidence

Coprolites

A number of canid coprolites had been preserved at the site and, although they probably belonged to dogs, there exists the possibility that they were coyote coprolites. These were found to contain salmon bone, as well as mammal bone that resembled dog (Vol. I, Chap. 10). Canid coprolites were also recovered from the Bridge River site; they contained fish and mammal bone, but no dog remains (Langemann 1987:250).

Isotopes

Carbon isotope (C13) tests were performed on HP 7 canid remains and analyzed by Berry (1991). Results showed that 75% of the dogs' protein was acquired from marine sources. It is possible, though, that an undetermined proportion of this protein was obtained through the consumption of human feces (no human coprolites have ever been recovered from the site) instead of by direct consumption. Regardless of the source, salmon was the dogs' principal diet.

Summary of Context and Analysis

Housepits 3 and 7

Kamloops Horizon type projectile points were found in both of these housepits and they share the same date (1,080 ± 70 BP) of terminal occupation; these two facts support the idea that the pithouses were contemporaneous during the Kamloops Horizon (1,200–200 BP). The dog skull in central floor area of HP 7 and the juvenile dog in the center of the HP 3 floor are, therefore, both directly associated with this time period.

As noted, the centrally located canid remains in both housepits were not associated with any artifacts or features. Two explanations exist for this context: 1) the animals were placed on the center of the floor upon pithouse abandonment, or 2) the dog remains arrived after the houses were abandoned, but before the structures burned and collapsed. No burning was evident on the bones of either canid, despite their presence on the floor before burning of the structure. The presence of flesh on the bone could have protected it from heat, but the HP 7 skull was recovered in poor condition, suggesting that it had been weathered for some time before arriving on the floor. It seems more likely that their location below the central roof opening protected the bones from burning; this is supported by Hayden's (1986) observation that few roof deposits were encountered in the centers of HP 3 and HP 7.

A notable difference between the two housepits was a much greater frequency of artiodactyl compared with fish bones in HP 7 than HP 3. If the greater number of canid remains in HP 7 represents a larger living dog population in this structure, and the dogs regularly ate fish bones, this might help explain the discrepancy in faunal proportions. Lord (1866, as cited by Crellin 1994)

provided ethnographic evidence for the use of salmon as dog food; this observation, in combination with the presence of salmon vertebrae in canid coprolites, lends support to the present explanation for the disparity in the number of fish bones between HP 3 and HP 7

Additionally, the artiodactyl bones were highly fragmentary and probably represent the practice of marrow extraction by the human inhabitants. The canid elements, on the other hand, were mainly whole and do not seem to have been processed in the same manner (Vol. I, Chap. 10). Also, except for the skull and juvenile on the housepit floors, identifiable canid remains were only present in the HP 7 storage pits, indicating different treatment from other mammal remains, which were largely absent from these features. Although the articulated individual in Storage Pit 88-P31 clearly did not suffer the same fate as the other dogs, it was still not carefully placed or associated with any artifacts.

Housepits 109 and 110

Like some of the other canid remains, those found in HP 109 and HP 110 were also recovered from living floors; however, they are found in strata associated with the Plateau Horizon (2,400–1,200 BP) and have been burnt to some degree. The wrapped sacrum and vertebrae in HP 109 may have held flesh when placed on the floor, as evidenced by differential heat modification, and could represent either a meal or a ritual offering before pithouse abandonment. The semi-articulated nature of the HP 110 canid, however, argues against use as a food resource.

Taphonomy

Carnivore scavenging was well represented in the Keatley Creek canid assemblage. An overwhelming feature of the collection was the relative lack of post-cranial remains. Of the over 3,700 elements possible for the number of dogs identified, only 1,229 were recognized in the analysis; the missing bones had to have been removed by some medium. Crania (NISP = 9) proved to be the most prominent element, while vertebrae and vertebral fragments (130), and phalanges (138) were the most numerous. A low limb bone recovery rate has been noted, with only 55 long bone and long bone fragments recovered, out of 180 possible whole elements. These element frequencies are indicative of a scavenged assemblage.

According to criteria set out by Haynes (1983), the element frequencies of the assemblage equate to a Stage 4 or "Heavy Utilization" scenario, which results from the seven month exposure of a carcass. It was also noted that bone damage of this magnitude is only observed when the carnivores responsible are captive or sedentary animals. Thus, it was most likely the Keatley Creek dogs that were responsible for scavenging the canid assemblage. Intense competition between the dogs, then, probably led to the removal of elements from the site (Kent 1981, 1992:375). The presence of dog bone in the canid coprolites supports this scavenging hypothesis.

Health Status

Dog 1 of Storage Pit 88-P31 was evidently in poor health: nine lesions representing active bone infection and distinct injuries were present on the right side of its face, on two ribs, and on its left hind foot. Injuries to the face were also present in Dog 2 from 89-P5 and Dog 2 of 88-P31. Facial injuries to canids form a consistent pattern in the archaeological record that has been attributed to human action (Baker and Brothwell 1980:94). It should be recalled that both canines of Cranium 1 in HP 7 (found on the floor) had been broken off. Beating by humans may explain the zygomatic arch injuries to Dogs 1 and 2 from 89-P5. These injuries, though, would have left the animals unable to work for some time. The only ethnohistoric evidence for dog beating is from the Arctic (M'Clintock 1860:289–290; Hantzsch 1977:143). Danial Williams Harmon (1800–1806, in Lamb 1957), however, recorded that "Indian Dogs" west of the Rocky Mountains and on the Plains were treated with great affection. Alternative explanations for these injuries can be found in packing related accidents (falling rocks), hunting wounds (a kick from a deer), or fighting between dogs. Other individuals and element units also showed evidence of fractures and infections, although these were less notable than the above and exhibited no discernible pattern.

Sex, Age, and Cause of Death

Most dogs were found to be between 18–24 months of age, but two were younger and two much older than this interval. Four males and three females were identified, while the sex of the rest could not be determined.

The most likely indication of humanly caused death was found in Dog 2 from 89-P5, with a fracture on the right frontal behind the orbit. Other animals, though, could have been killed in ways that left no skeletal traces, or traces that were more ambiguous as to their cause.

Interpretations

Domestic dogs were clearly a significant component of Keatley Creek society during the Plateau (2,400–1,200 BP) and Kamloops Horizons (1,200–200 BP). Canid remains from Storage Pit 88-P31 have been directly dated to Plateau Horizon times and two of the six distinct sub-assemblages were directly associated with Kamloops Horizon occupations: the partial immature

remains from HP 3 and the single cranium from the HP 7 floor. We will now take a look at how these dogs contributed to Keatley Creek society by evaluating the five hypotheses developed by Driver (1976) and by introducing reasonable alternatives.

Hypothesis Evaluation

Hunting

This important economic function has proven difficult to identify archaeologically, with sources of evidence probably lying solely in burial contexts and the identification of distinctive hunting injuries. Good hunting dogs were valuable during ethnographic times on the Plateau, but there was no discernible evidence for this function at Keatley Creek. The dogs killed or abandoned in HP 7 could not have been considered valuable in this sense.

Clothing

No cutmarks at the distal ends of long bones, indicative of skin exploitation, were observed on any of the canid remains; it is possible, though, that if done correctly, marks would be absent. The apparent wealth of some households (i.e., HP 7), and the presence of large numbers of artiodactyl bones, would probably preclude the use of dog skins for clothing.

Transportation

Savage (1986) has noted that dogs used as draft animals show distinctive patterns of bone changes in the lower thoracic and lumbar vertebrae. Arthritic changes at the sacro-iliac joint and substantial muscle attachments on the femora have been attributed to sled pulling. Like a sled dog, the fully articulated individual of Storage Pit 88-P31 was also subjected to prolonged stress, but of a clearly different nature. The enlarged and flattened spinal processes, from just behind the shoulder to the front of the hip, correspond to the placement of a pack. This individual was probably exploited as a pack dog for the majority of its life. Other element units in the assemblage showed similar pathologies. Vertebral Column 3 exhibited the same flattening of the spinal processes, while Forelimb 1 had exaggerated muscle attachments on the humerus. The cranium of Dog 5 from Storage Pit 89-P5 had an exostosis on the occipital protuberance. It is possible, then, that all of these elements belonged to Dog 5, which was also exploited as a pack dog.

With the location of Keatley Creek 1.5 km from the Fraser River, and the importance of the salmon resource to Plateau culture, pack dogs would have proven highly useful animals. The uphill travel required around the steep canyon walls could explain the well-defined muscle attachments on these individuals, and the common rockfalls in the area could account for the observed injuries. It is equally possible that dogs were used as pack animals in upland areas when people went hunting or root gathering. Teit (1909:532) observed that the Shuswap regularly used dogs as beasts of burden.

Food

The dog bones at Keatley Creek did not undergo the same heavy processing as other faunal remains at the site and were not distributed in the same manner (i.e., around hearths), so they were probably not regularly exploited as a food resource. Partial burning of the HP 109 canid remains, though, could represent use of dogs as food.

Ritual (Sacrifice and Feasting)

With the majority of post-cranial bones missing, it was difficult to evaluate the feasting hypothesis. Of the midden assemblages on the Plains, only 15% of the canid elements exhibited cutmarks (Snyder 1991). The possibility exists that people or dogs removed all of the feasting remains from Keatley Creek. Alternatively, the dogs may have been pit-roasted and then disarticulated by hand, leaving no distinguishing marks. These scenarios could explain the lack of evidence for dogs being used in feasting. At least two of the dogs were obviously sick and would have made poor feasting animals, although they might have been prime targets for ritual sacrifice. By the ethnographic period, the Western Shuswap, Chilcotin, and Carrier, but not the Thompson or Lillooet, had adopted the coastal Dog Dance, or Dog Eating Ceremony. In order for this event to have the proper effect, participants had to regard dog flesh as repulsive and, therefore, not as a suitable feasting food. In fact, most groups that were in regular contact with the coast did not regularly eat dogs. The above factors detract from feasting as a viable hypothesis. Ritual sacrifice of dogs at Keatley Creek, however, is supported by much of the available evidence, including the apparent intentional killing of several dogs.

Dog sacrifices were common on the Plateau, ethnographically, when their owners died. These sacrificed dogs were then hung from poles or trees near the grave (Smith 1900; Teit 1900, 1909; Simon Fraser 1808, in Lamb 1960:85). In fact, a number of native groups in Canada hung sacrificed dogs from poles (Dublon 1677, in Thwaites Vol. 60:227; Henry 1809); Siberian groups, particularly the Koryak, also exhibited this cultural trait (Jochelson 1908). For reasons stemming from death, illness, prolonged foul weather, or perhaps after a Dog Dance ceremony, carcasses may have been hung outside on poles. These dog remains

would have decomposed there over time and, eventually, some portions would have fallen to the ground, where they could have been scavenged by other dogs. Some carcasses would have been accessible to scavengers longer than others and would, as a result of their exposure, be more heavily weathered. These bones may have been collected afterwards to bring inside the house. Once there, the remains seem to have been preferentially deposited in one of two areas: on the center of the floor or in a storage pit.

The pattern of leaving a dog, or part thereof, on the center of the floor may represent a form of ritual sacrifice performed, perhaps only prehistorically, upon the abandonment of a dwelling, or at other important household events. The single dog skull from HP 7, the partial juvenile from HP 3, and the burnt canid remains from HP 110 were all recovered from the center of the floor. An articulated individual from HP 2 at the Baker Site was also found in this context (Wilson 1992). Conceivably, this recurring theme represents a sacrificial event performed by dog owners only, with the purpose of spiritually protecting the dwelling or signifying ownership during vacancy.

In Storage Pit 89-P5 of HP 7, floor-like deposits were only found above the canid remains, not in the surrounding matrix; thus, the deposition of these dog remains probably does not represent a simple housecleaning event. Two hundred small bone fragments less than 3 cm in size were collected and placed in this pit, and identifiable dog remains were absent from all parts of the house, other than the center of the floor or the other storage pit. Ethnographically, dogs were considered to have magical power or could provide spiritual protection (Teit 1900:354); the collection and special placement of small dog bone fragments may represent that belief. In addition, the wing bones of a hawk and a beaver humerus and femur (both burnt) were also found in the lower part of the pits, while bones from other species were largely lacking (Vol. I, Chap. 10, Appendix III). Among many native groups, the first beaver of the season was used in a ceremony (Jenness 1932). It is possible, then, that this storage pit was used as a receptacle for ritual remains only. Similar concentrations of dog bones in pits at the Bridge River site (Langemann 1987) indicate that some such special treatment of dog remains was a recurring pattern in the Lillooet region.

Protection and Companionship

Dogs that performed this function should have undergone careful burial and probably would have lived to old age. The inclusion of dogs in human burials elsewhere on the Plateau (Langemann 1987; Pokotylo et al. 1987; Sanger 1968; Smith 1900) may represent an affectionate bond. There is no evidence of this at Keatley Creek.

Status Display

The greatest number of canids at the site were recovered from HP 7 (MNI = 12), meaning that some groups had surplus dogs. Salmon was the principle food given to dogs and people would have needed a food surplus to support the additional animals. This can be seen as evidence of status display and accords well with the wealth items found in this housepit. The fact that 75% of the dogs' diets was salmon indicates a relatively high cost for keeping and breeding dogs, consistent with their roles as status display items.

Natural Formation

Finally, it is worth considering possible non-cultural scenarios for the formation of the large canid assemblage. For example, it is possible that in times of stress many groups abandoned unwanted (old or sick) dogs. On the Plateau, this might occur when villages were abandoned in the spring. Packs of stray dogs could then have wandered around the abandoned village during the summer. Some of these animals may have subsequently died of illness or starvation, perhaps after gaining entry to an empty pithouse. Once there, other canids could have scavenged the carcasses; some elements would have been removed because of competition. Upon their return in the fall, people might have cleaned up the remains on the floor and placed them in the pits. Given the special placement of some dog remains in the center of the floor, and the burial of others in storage pits, this scenario does not seem to satisfactorily explain all the key observations from the site.

Conclusion

The remains of at least fifteen domestic dogs were recovered from Keatley Creek during the 1988 and 1989 field seasons. This constitutes the largest prehistoric canid assemblage to date on the British Columbia Plateau. Dog bones were present in four of the housepits excavated at the site in contexts spanning the Plateau (2,400–1,200 BP) and Kamloops (1,200–200 BP) Horizons. Through the osteological analysis of these bones and the examination of archaeological information from the site, our understanding of the relationship between humans and dogs in Plateau prehistory, including functional roles, has been significantly enhanced. Two dogs were clearly exploited as pack animals for most of their lives, and at least two others appear to have been part of a ritual surrounding pithouse abandonment. A few possible indications of beating by humans were present, and one

such instance probably led to the dog's death. In fact, many of the dogs were in poor health and most died before reaching two years of age. Differences were noted in the number of dogs found in the housepits, particularly the concentration in HP 7, and may be a manifestation of status display. Although none of the other relationships explored could be substantiated by the available data, special treatment is evident in the intentional burial or placement of many canid remains encountered at the site. Besides the cultural factors responsible for the formation of the assemblage, extensive carnivore scavenging took place, probably by other dogs and before people deposited the bones. These observations all support the conclusion that dogs were an integral component of Keatley Creek economy and society, and may have been used for ritual or prestige displays as well.

Note: The information contained within this paper is derived from an unpublished M.A. thesis by the principal author in 1994 entitled *Is There a Dog in the House: The Cultural Significance of Prehistoric Domesticated Dogs in the Mid-Fraser River Region of British Columbia*. Department of Archaeology, Simon Fraser University, Burnaby. Researchers are encouraged to consult this document for a more in-depth look at the Keatley Creek canid remains.

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