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Evidence of Domesticated Dogs and Some Related Canids in the Eastern Great Basin

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*This paper synthesizes the data on prehistoric dogs (*Canis familiaris*) and other related canids in the eastern Great Basin. Data presented here suggest that domesticated dogs were relatively rare in the eastern Great Basin throughout the Holocene. Skeletal remains of dogs appear to be more commonly associated with sites in wetland habitats, a pattern previously identified in the western Great Basin. In these habitats, dogs may have been able to subsist with little or no assistance from humans.*

PREHISTORIC domesticated dogs (*Canis familiaris*) are well described in the literature and apparently were widely distributed throughout the New World (e.g., Allen 1920; Haag 1948; Lawrence 1967, 1968; Olsen 1968, 1976, 1985; Brothwell et al. 1979; Beebe 1980; Dansie 1984, 1990; Clutton-Brock 1989; Wing 1989; Morey and Wiant 1992). Their presence and relative abundance in archaeological assemblages is of interest because dogs may be employed in a variety of tasks, especially as beasts of burden and effective hunting aids. Similarly, their presence can alert archaeologists to a potential and significant source of attrition affecting faunal assemblages (e.g., Kent 1981, 1993; Marean and Spencer 1991; Hudson 1993).

This paper synthesizes data on dog skeletal material recovered from archaeological sites in Utah. Known dog remains are summarized, and some of the more questionable and fragmentary skeletal material is discussed. These data show that the archaeological record of dogs in the eastern Great Basin is particularly scant. Although domesticated dogs appeared about 10,000 years ago in the eastern Great Basin, their populations remained relatively low throughout the Holocene. Dog skeletal remains are somewhat better represented in archaeo-

logical assemblages associated with some wetland habitats, a pattern previously observed in Nevada (Dansie 1990) where it has been linked, in part, to their ability to consume refuse.

DOMESTICATED DOG: ORIGINS AND OCCURRENCES IN THE NEW WORLD

Dogs were domesticated, probably through two or more independent lines, in Europe and the Middle East some 10,000 to 12,000 years ago (Turnbull and Reed 1974; Davis and Valla 1978; Benecke 1987). Evidence suggests that they were ultimately derived from wolves (*Canis lupus*), although the origin of actual parent population(s) has been the subject of controversy (Scott 1968; Olsen and Olsen 1977; Clutton-Brock 1981, 1984; Olsen 1985; Morey 1992; Morey and Wiant 1992). Most scholars agree that domesticated dogs probably arrived in the New World with the earliest human emigrants from Siberia.

Possibly the earliest dog remains reported in North America are from Old Crow Basin in the Yukon Territory (Beebe 1980) and date to 20,000 years B.P. (but see Walker and Frison 1982; Olsen 1985). In western North America, dog remains associated with a Folsom occupation (10,500 to 10,800 years B.P.) have been

recovered from Agate Basin, Wyoming (Walker and Frison 1982). Similarly old remains were reported from Jaguar Cave in Idaho and associated with a radiocarbon sample that was originally dated to 10,370 years B.P. (Lawrence 1967, 1968), but has now been revised to between 3,000 and 4,000 years B.P. (Gowlett et al. 1987). A recent report of the Koster site in Illinois demonstrates that in some parts of North America dog burials were established by 8,500 years B.P. (Morey and Wiant 1992).

In some regions adjacent to the eastern Great Basin, dog skeletal remains appear to be common. For example, skeletal remains and mummies are abundant in archaeological assemblages in the North American Southwest, appearing between A.D. 400 and 750 (Guernsey and Kidder 1921; Lawrence 1967; Olsen 1968, 1976, 1985; Colton 1970; Emslie 1978; Clark et al. 1987), and are particularly common at habitation sites that date between A.D. 1050 and 1273 (Olsen 1985). In the western Great Basin, Dansie (1990) found evidence of domestic dogs extending back some 3,500 years. In this area, dogs, related wild canids, and carnivores appear to be more common in archaeological assemblages associated with lacustrine settings than those in other types of habitats (see also Dansie 1984; Schmitt and Sharp 1990). In the eastern portion of the Great Basin, dog remains appear even earlier, between 10,000 and 9,000 years B.P. (Grayson 1988). Although individual occurrences of skeletal remains recovered from eastern Great Basin sites have been sporadically reported in a variety of sources (e.g., Haag 1966, 1968, 1970; Janetski et al. 1992), no synthesis of these data exists.

MATERIALS, METHODS, AND SOME EASTERN GREAT BASIN EXAMPLES

Published site reports were used to identify locations where dog remains have been reported previously in Utah. Although every effort was made to thoroughly search the literature, it is

likely that some specimens recovered from some archaeological sites were missed, especially those reported in unpublished contract reports. Therefore, the sample reported here should not be considered exhaustive. In particular, sites from the extreme southwestern corner of the state (with two exceptions) were mostly omitted from this study.

All canid remains were obtained from collections housed at the Museum of Natural History at the University of Utah, the Museum of Peoples and Cultures at Brigham Young University, and the U. S. Department of Interior, Bureau of Land Management, in Cedar City. Additional specimens not previously reported in the literature but provisionally identified as dog were located by Janetski during recent archaeological excavations of sites around Utah Lake.

Once acquired, skeletal material was examined to verify taxonomic identification. In practice, species designations can only be made through "multiple, proportional measurements—mainly on a number of skulls, mandibles, and dentitions" (Olsen 1985:91). However, the small number of skulls and mandibles available for examination in this sample made this infeasible. The identifications made for this paper were based on the presence or absence of traits commonly displayed by the skulls and mandibles of aboriginal domesticated dogs and regarded by many canid specialists as diagnostic. These include the congenital absence of one or more of the mandibular premolars, cusp morphology of the mandibular first molar, crowding and bowing of the dental arcade, and caudal bending in the tip of the ascending ramus (see Young and Jackson 1951; Krantz 1959; Lawrence and Bossert 1967; Olsen 1985; Benecke 1987; Dansie 1990; Morey and Wiant 1992). Only those cranial and mandibular specimens displaying several of these traits were identified as domesticated dog. Table 1 lists the museum and archaeological specimens examined and positively identified as domesticated dog. Specimens

Table 1
IDENTIFIED DOG REMAINS IN UTAH

Site	MNI ^a	Body Parts	Age Range	Remarks
42To13 ^a	1	mandible	9,000-10,000 B.P.	recovered from general fill
42Bo36 ^b	2	mandibles	7,450-8,000 B.P.	recovered from general fill
42Bo2	1	complete skeleton	unknown	recovered from general fill
42Ut808 ^c	1	complete skeleton	4,790-4,650 B.P.	found in burial pit
42Ws964 ^d	2	complete skeletons	A.D. 650	found in storage cist
42Bo57	1	mandible	A.D. 850-1060	unknown
42Sv633 ^e	3	crania, mandibles, partial skeleton	A.D. 980-1260	recovered from general fill
42Un95 ^f	2	complete skeletons	A.D. 1050-1200	found in borrow pit
42Sv5 ^g	2	mandibles	A.D. 1075-1275	recovered from general fill
42Md180 ^h	1	partial skeleton	A.D. 1190-1260	recovered from general fill
42Ka1969 ⁱ	1	complete skeleton	A.D. 950-1050	burial in midden
Site 11 ^j	2	mandibles	Fremont	--
42Ut592 ^k	1	partial skeleton	A.D. 1330-1636	recovered from a pit
42Sv1686 ^l	1	maxilla	Fremont	recovered from general fill
42Ut13 ^m	6	mandibles	Late Prehistoric	recovered from general fill
42To13 ^a	1	cranium	unknown, probably recent	recovered from general fill
42Ut839 ⁿ	1	mandible	unknown	--

^a Grayson (1988).

^b Haag (1970); other postcranial bones identified as *Canis* sp. also occur.

^c Janetski et al. (1992).

^d G. Dalley (personal communication 1994); skeletons found in disturbed context and may post-date cist.

^e Sharp (1992).

^f Haag (1966).

^g Aikens (1967); other postcranial bones identified as *Canis* sp. also occur.

^h Haag (1968).

ⁱ Nickens and Kvamme (1981).

^j These specimens were collected by an amateur archaeologist from the shore of Utah Lake.

^k This specimen is probably a wolf/dog hybrid.

^l Janetski (personal observation 1994); specimen is stored at Fremont Indian State Park.

^m Beeley (1946).

ⁿ minimum number of individuals.

mens from 42Sv633, 42Sv1686, and 42Md180 were not re-examined as part of this study but have been positively identified as dog by other analysts.

Domesticated Dog?

Canid skeletal remains of uncertain taxonomic affiliation and archaeological specimens

unavailable for re-examination, but described in site reports as probable dog, are listed in Table 2. Many of these are fragmentary postcranial elements, mandibles, or loose teeth that are difficult to identify to species; consequently, few of these questionable remains could be identified beyond genus.

Most of the Table 2 assemblages contain

Table 2
POSSIBLE DOG REMAINS FROM SITES IN UTAH

Site	NISP ¹	Body Parts	Age Range	Remarks
42Bo36 ^a	2	postcranial	unknown	unprovenience
42To3 ^b	8	postcranial	6,100-3,200 B.P.	possibly dog or coyote
42Bo268 ^c	2	unknown	5,000-1,200 B.P.	--
42Bo45 ^c	U	unknown	2,400-600 B.P.	--
42Sv662 ^d	1	cranium	A.D. 770-910	possibly dog or coyote
42Sv23 ^e	1	cranium	A.D. 650-1300	cut-marked skull
42In124 ^f	1	postcranial	A.D. 890-1140	possibly dog or coyote
42Bo107 ^g	2	postcranial	A.D. 1000-1240	possibly dog or coyote
42Sv5 ^h	5	postcranial	A.D. 1075-1275	one distal femur is carbonized
Site 11 ⁱ	4	postcranial	Fremont	one phalanx is cut-marked
42Md750 ^j	U	unknown	Fremont	--
42Ut636	44	postcranial	A.D. 1434-1642	see discussion in text
42Ut13 ^k	4	mandible	Late Prehistoric	see discussion in text
	29	loose teeth		
	12	postcranial		many are charred
42Ut878	43	postcranial	Late Prehistoric	see discussion in text
42Ut817 ^l	1	postcranial	unknown	--

^a Haag (1970).

^b Juell (1983); this specimen was not available for reanalysis.

^c Dalley (1976); these specimens were not available for reanalysis.

^d Madsen and Lindsay (1977); this specimen was not available for reanalysis.

^e Rood and Butler (1993); this specimen was not available for reanalysis.

^f Dalley (1970); this specimen was not available for reanalysis.

^g Fry and Dalley (1979).

^h Aikens (1967).

ⁱ These specimens were collected by an amateur from the shore of Utah Lake.

^j Juell (1984); this specimen was not available for reanalysis.

^k Beeley (1946).

^l minimum number of individuals (U = unknown).

only a few fragmentary canid bones (NISP < 10). In most instances, these were bones recovered from the general fill or midden locations and were associated with other food bone. However, three assemblages (42Ut13, 42Ut878, and 42Ut636) contain appreciable numbers of canid bones and some elements are complete or nearly complete. Because large numbers of bones may signify a disturbed burial, the recovery contexts of these specimens are

briefly described below.

Site 42Ut13 is unusual because it contained a large number of loose but complete teeth (crowns with roots [NISP = 29], Fig. 1), and only a few fragmentary postcranial remains. Some of the teeth are from coyote, one from a bear (*Ursus* sp.), and eight lower first molars (M_{1s}) from undifferentiated canids. The postcranial remains include fragmentary metapodials and phalanges from a very large, robust canid,

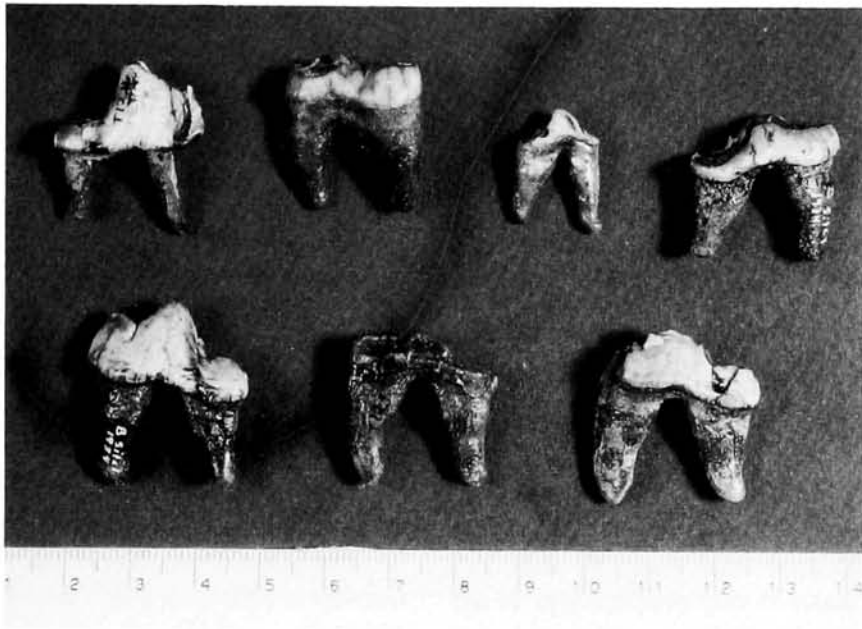


Fig. 1. Complete teeth from 42Ut13.

probably a wolf. Other postcranial elements appear to be from a smaller-sized canid. At least one of these, a distal humerus, displayed a cutmark, probably resulting from dismemberment or possibly skinning (e.g., Binford 1981). Other identifiable bones include a coyote (*Canis latrans*) partial mandible, a few postcranial elements from a wolf, and at least seven hemimandibles (some with teeth) from domesticated dogs.

The spatial relationships of the 42Ut13 specimens within the site are not known. However, this large aggregate of canids may be artificial. Specifically, the excavation report notes that the site was inundated by water many times since it was occupied (Beeley 1946) and many of the bones display signs of water transport (K. Lupo, personal observation 1993). As a result, the associations of materials at this site remain questionable.

Most of the postcranial remains from site 42Ut 636 are from a single large canid and were discovered in a pit feature. These skeletal remains are unique in two respects. First, the right

ischium of the innominate displays the remnants of a traumatic wound; a small, deep, angularly shaped puncture. Morphologically, this puncture does not resemble those typically produced by carnivorous mammals (e.g., Binford 1981) and it may have been inflicted by a projectile. Although bone regrowth indicates that the wound had begun to heal, some of the adjacent elements in the lower back region (lumbar vertebrae) had become infected. This suggests that the animal survived the initial wound for several weeks but was probably ill and disabled during this time; it may have ultimately died of this wound or have been more easily dispatched by humans because of it. Second, the suite of skeletal elements and associated bone damage suggests that the animal was minimally skinned and probably partially butchered. Many of the elements display cutmarks resulting from filleting and skinning, including a caudal vertebrae that displays a deep, groove-like incision that was inflicted when the tail was cut off.

Most of the bones from 42Ut878 were found adjacent to a pit. The assemblage contains a

partial skeleton from a single, large canid, and forelimb elements of two additional animals; one much larger than the other. One large, fragmentary ulna displays a series of deep hackmarks on the lateral shaft which may have been inflicted during dismemberment. The smaller animal is represented only by a fragmentary ulna.

Additional Morphometric Observations

To limit specific identification of the specimens from 42Ut13, 42Ut636, and 42Ut878 to a narrower range of possibilities, two additional lines of morphometric evidence were examined; M_1 and limb bone lengths. Coyote M_1 s can be distinguished from those of dogs and wolves on the basis of cusp morphology. In the coyote, the metaconid, hypoconid, and entoconid of the M_1 are strongly developed; the hypoconid and entoconid are proportionally very similar in size. In contrast, dogs and wolves have a poorly developed metaconid and the hypoconid is twice as large as the entoconid (Krantz 1959; Lawrence and Bossert 1967; Beebe 1980). Thus, although M_1 s from coyotes can be confidently distinguished from those of dogs and wolves, the latter two taxa may not be distinguished solely on the basis of cusp patterning.

Of the eight M_1 s in the 42Ut13 assemblage, it is not possible to identify cusp patterning of two crowns as they exhibit pronounced wear. The remaining six display cusp morphology similar to that of dogs and wolves. To clarify the identification of these teeth, the length of these six M_1 s from 42Ut13 were compared to those of wolves, coyotes, domesticated dogs, and wolf/dog and coyote/dog hybrids. Figure 2 shows that the M_1 length for wolf populations is larger than that of coyotes and domesticated dogs, but the M_1 length of domesticated dogs and coyotes overlaps. Only the M_1 length of the wolf/dog hybrids overlaps those of coyote, domesticated dog, and wolf. The lengths of the

six 42Ut13 specimens suggest that at least three probably represent domesticated dog. Three remaining specimens fall within the size range of wolves and wolf/dog hybrids and therefore cannot be identified further.

Both 42Ut636 and 42Ut878 contain only postcranial canid elements. Morphometric measures of postcranial bones for dogs and other wild canids are limited in the literature, making comparative analysis of these elements difficult (but see Allen 1920; Haag 1948, 1970; Colton 1970; Emslie 1978; Parmalee and Bogan 1978; Dansie and Schmitt 1986). Given the paucity of published data, element size is not a good criterion for distinguishing canid species because some New World domesticated dogs overlap in size with some wild canids (Dansie 1984; Olsen 1985). Furthermore, intentional and unintentional hybridization of dogs with coyotes and wolves was common in many parts of North America (Lawrence and Bossert 1969; Dansie 1990; Schmitt and Sharp 1990; see especially Walker and Frison 1982 and the references therein), and probably amplified the overlap in size between wild and domesticated canids. Techniques have been developed to identify the skulls and mandibles of dog/wild canid hybrids (Lawrence and Bossert 1969; Mengel 1971; Elder and Hayden 1977; Walker 1980; Walker and Frison 1982; Moore et al. 1983; Schmitt and Sharp 1990), but comparable techniques have not been developed for postcranial remains. Even though element size may not be used to identify specimens to species, it may be used to limit specific identifications to several possibilities while eliminating others.

Figure 3 compares the greatest ulna length (as defined by Von den Dreisch 1976) from specimen 42Ut636 to ulna lengths of known dogs and some wild canids. Ulna greatest length (GL) was employed here because the ulna was the most complete element from 42Ut636. Note that the specimen from 42Ut636 exceeds the size of other identified domesticated

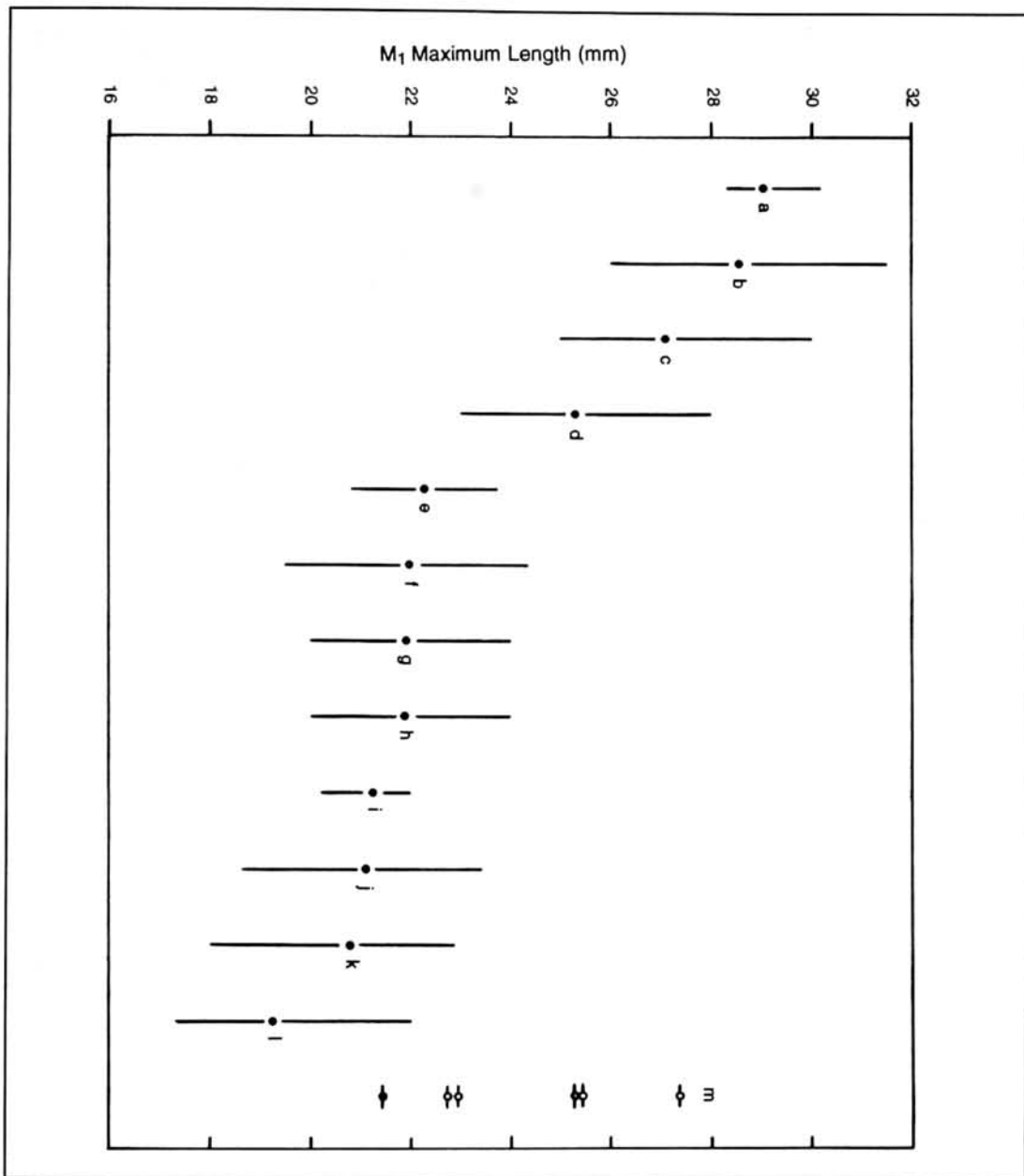


Fig. 2. Length of M_1 of dogs and wild canids: (a) *Canis lupis youngi*, male specimens from western United States, $n=13$ (Young and Goldman 1964:495); (b) *Canis lupis*, male specimens from western United States, $n=62$ (Nowak 1979:152); (c) *Canis lupis*, female specimens from western United States, $n=47$ (Nowak 1979:152); (d) wolf/dog hybrids, sex unknown, $n=3$, one specimen from 42Ut592 (discussed in text), one specimen from Stillwater Marsh (Schmitt and Sharp 1990); (e) *Canis familiaris*, sex unknown, Eskimo dog, $n=6$, (Haag 1948); (f) *Canis latrans*, male specimens from western United States, $n=99$ (Nowak 1979:150); (g) *Canis latrans*, sex unknown, three specimens from the Nevada State Museum (Schmitt and Sharp 1990), three specimens from the University of Utah Archaeological Center, one specimen from 42Bo120 (discussed in text); (h) *Canis familiaris*, sex unknown, Plains Indian dog, $n=9$ (Allen 1920), (i) *Canis familiaris*, sex unknown, Siberian dog, $n=3$ (Haag 1948), (j) *Canis latrans*, female specimens from western United States, $n=99$ (Nowak 1979:150); (k) *Canis familiaris*, sex unknown, specimens from 42Ut13, 42Ut808, 42Bo36, 42Un95, 42Sv5, 42Ka1969, 42Ws964, and from Nevada (Schmitt and Sharp 1990), $n=16$, (l) *Canis familiaris*, sex unknown, Southwestern dog, $n=7$ (Haag 1948); (m) M_1 s from 42Ut13.

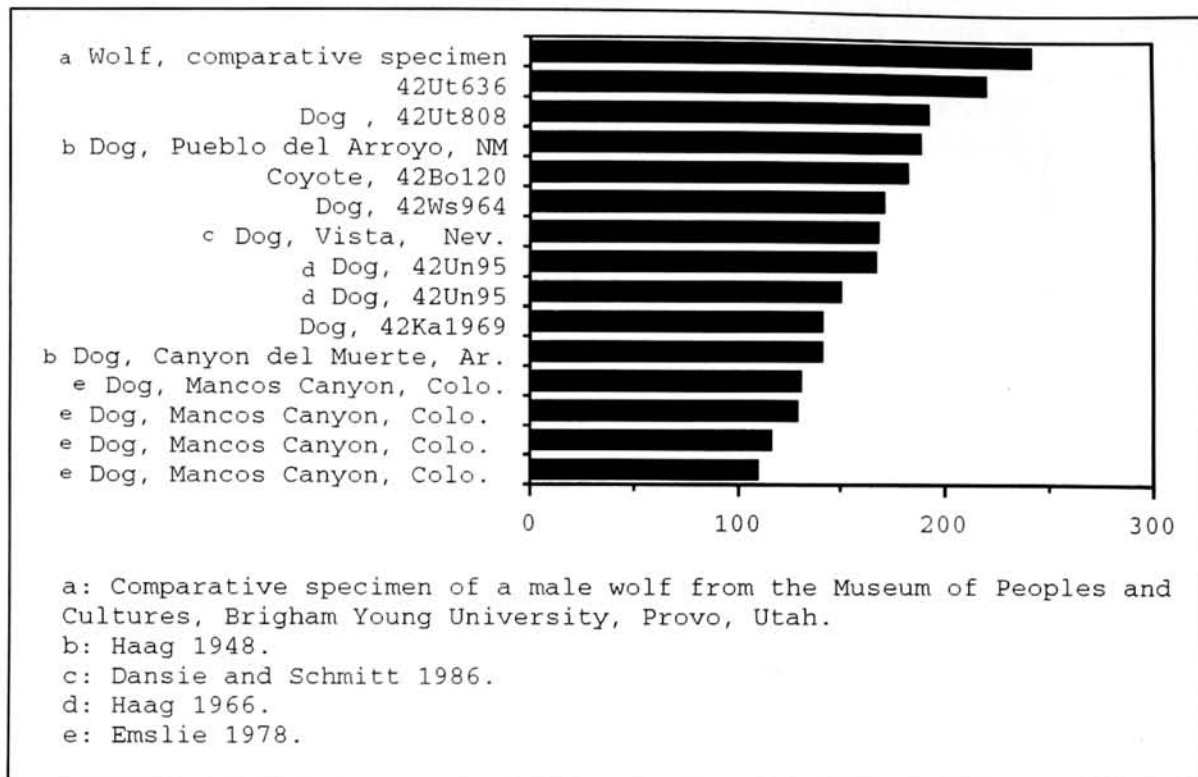


Fig. 3. Greatest ulna length (mm.) of dogs and canids as defined by Von den Driesch (1976).

dogs and coyotes. These data suggest that the 42Ut636 skeletal elements may be from a wolf or possibly a wolf/dog hybrid.

The postcranial elements from 42Ut878 were smaller in size than those from 42Ut636. Figure 4 compares the greatest humerus length from one of the larger 42Ut878 specimens to humerus lengths of known dogs and canids reported here and in the literature (e.g., Von den Driesch 1976). Clearly, the length of this specimen falls within the range of variability documented for domesticated dogs in the Great Basin and probably represents an animal closer in size to a dog or perhaps coyote/dog hybrid.

DISCUSSION OF THE DATA

Temporal and Geographical Distribution

Overall, the material reflects a time interval between approximately 10,000 and 500 years

B.P. The presence of domesticated dog in the Great Basin during the early Archaic is firmly established by a mandible from Danger Cave (42To13) found associated with a feature that dates between 10,000 and 9,000 years B.P. (Grayson 1988). Despite their early appearance, the number of archaeological specimens in Utah is limited, especially those found along the eastern rim of the Great Basin (Fig. 5). This appears to be a fairly consistent trend through time. Dog remains are more commonly associated with Formative sites, but three of these—Snake Rock Village (42Sv5; Aikens 1967), Nawthis Village (42Sv633; Sharp 1992), and Caldwell Village (42Un95; Haag 1966)—are not in the Great Basin. Two additional sites, 42Ws964 and 42Ka1969 (G. Dalley, personal communication 1994), are in the southernmost corner of the eastern Great Basin but have clear cultural affiliations with the Southwest.

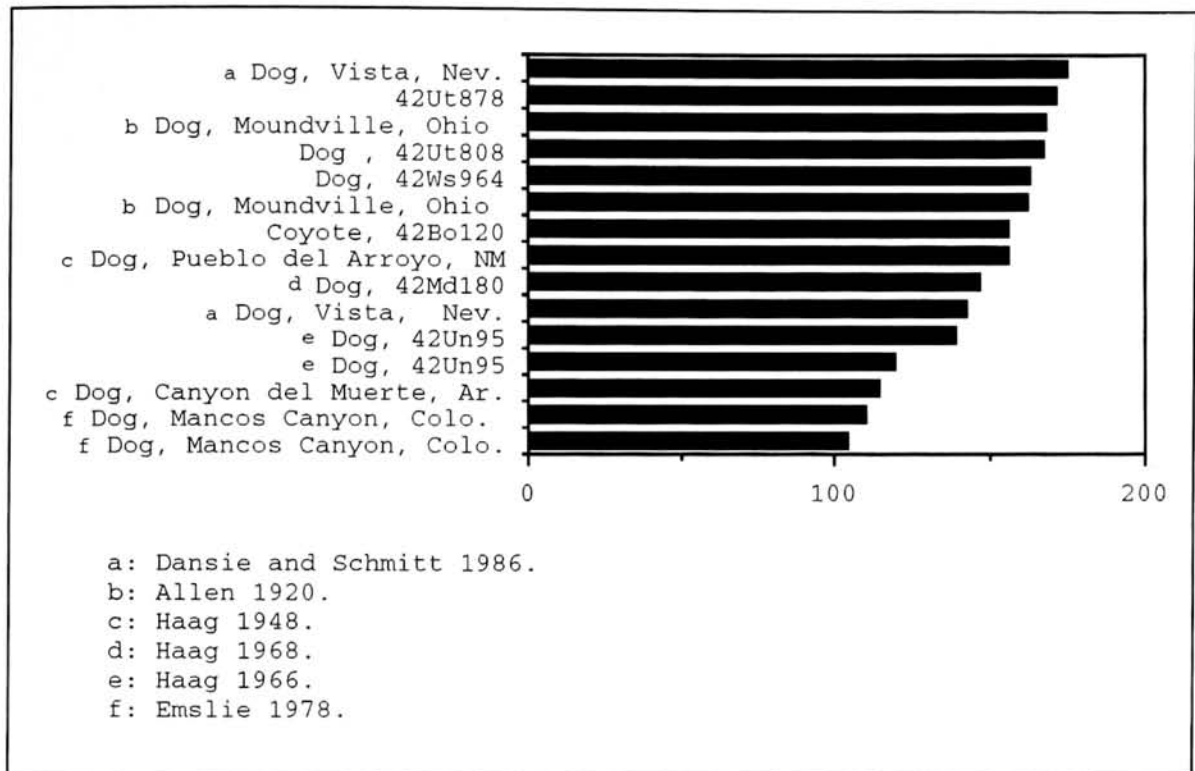


Fig. 4. Greatest humerus length (mm.) of dogs and canids as defined by Von den Driesch (1976).

Many of the diagnostic dog remains within the eastern Great Basin are from sites in wetland habitats, surrounding Utah and Great Salt lakes. Dogs are found in sites associated with other types of habitats, but they seem to be more commonly represented in wetland areas. This too appears to be a consistent trend through time. For example, domesticated dog is represented in sites surrounding Utah Lake, from the Middle Archaic through the Late Prehistoric periods (see Table 1).

Intra-Taxonomic Comparisons

Despite the paucity of skeletal remains, some interesting morphological trends in aboriginal dog populations in the eastern Great Basin can be identified relative to dogs previously described in the literature. Previous analyses of aboriginal domesticated dogs in North America have identified at least three

breeds (Allen 1920; Haag 1948). The largest of these is the Eskimo dog, which is broad-muzzled and wolf-like in appearance, but smaller than a wolf in body size. However, most aboriginal dogs in North America fall within two size categories: large and small. Olsen (1985) described large-sized aboriginal dogs as being comparable in proportion to coyotes. These specimens (Allen 1920; Haag 1948) are variously referred to in the literature as large Pueblo or Plains Indian dogs, and are smaller in size than Eskimo dogs. Small dogs are represented by at least two variations; one with a short muzzle (i.e., short-faced) and one with a longer, but more narrow, muzzle. In contrast to large-sized dogs, small-sized dogs are proportionally comparable to a modern fox terrier (Olsen 1985). Dansie (1984) reported that aboriginal dogs in the western Great Basin fell into two size categories: those smaller than and those

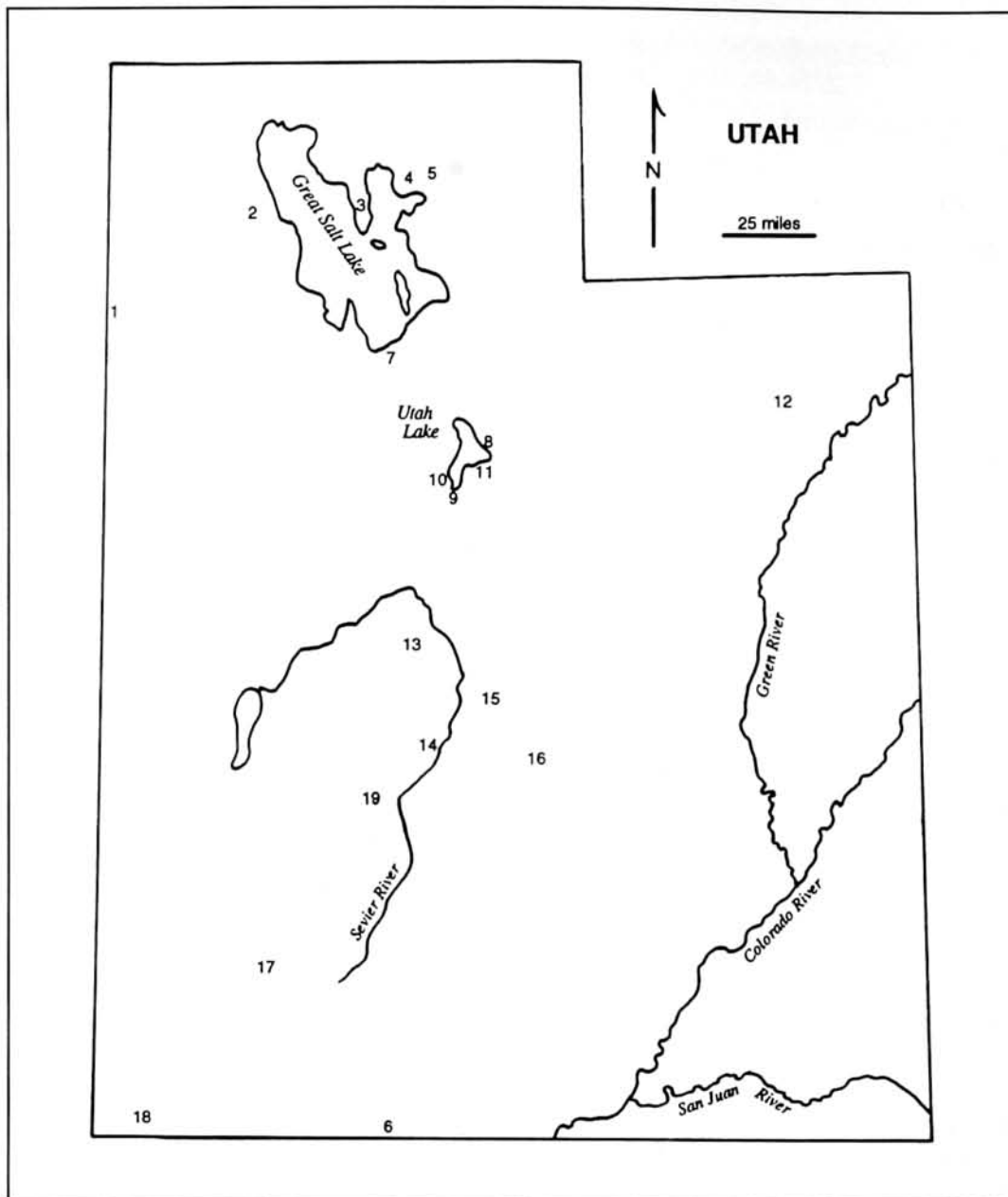


Fig. 5. Location of selected sites with dog and canid skeletal remains: (1) Danger Cave (42To13); (2) Hogup Cave (42Bo36); (3) Promontory Point Cave 2 (42Bo2); (4) Levee (42Bo107); (5) Orbit Inn (42Bo120); (6) 42Ka1969; (7) Black Rock Cave (42To3); (8) 42Ut878, Site No. 11, 42Ut839, 42Ut817; (9) 42Ut636; (10) 42Ut808; (11) 42Ut13; (12) Caldwell Village (42Un95); (13) Pharo Village (42Md180); (14) Backhoe Village (42Md750); (15) Nawthis Village (42Sv633); (16) Snake Rock (42Sv5); (17) Median Village (42In124); (18) 42Ws964; (19) Five Finger Ridge (42Sv1686).

larger than a coyote. The latter appear to be a distinctive type of dog, broadly similar to the

Plains Indian dog, and well-represented in the archaeological record in Nevada (Dansie 1984;

Dansie and Schmitt 1986). More recently, Walker and Frison (1982) identified another distinct, large, semi-domesticated dog breed from the northwestern Plains of North America. These animals are slightly smaller than local wolves but probably bigger than the large-sized aboriginal dog.

Conventional analyses of dog remains focus on cranial attributes, such as muzzle size and shape, to identify different dog breeds and make comparisons between and within geographic areas. These analyses are only applicable if many complete crania are available; however, only four complete or partially complete crania were identified in the Utah literature. Two of these, one from Pharo Village (42Md180; Haag 1968) and one from Nawthis Village (42Sv633; Sharp 1992) were unavailable for study, but morphometric measurements for each are reported in the literature. Two additional and nearly complete skulls recovered from Caldwell Village (42Un95) were available for study (Fig. 6) and were described by Haag (1968). A fifth, but very fragmentary, skull recovered from 42Ut808 has also been described elsewhere (Janetski et al. 1992). Interestingly, the 42Ut808 skull shows marked similarities to dogs recovered from Desiccation Cave near Pyramid Lake in Nevada (Dansie 1984). The 42Ut808 specimen, which predates the Nevada specimens, is missing its lower fourth premolar from both sides of its jaw but, unlike the dogs from Desiccation Cave, does not show retention of its lower deciduous first molars.

Relative mandible length suggests that the earliest dog remains recovered from Danger Cave in the eastern Great Basin are from a relatively short-muzzled animal. Although the actual size and stature of this individual is indeterminable because the limb bones were not recovered, the mandibular length clearly reflects a small-sized animal. Most dogs from later period sites in Utah have longer and more robust mandibles than this early Archaic speci-

men. Figure 7 shows the early mandible specimen from Danger Cave and one from Hogup Cave (42Bo36; Haag 1970). Both individuals were adults, but note the shorter length of the Danger Cave specimen in relation to the Hogup specimen. The mandible from Hogup Cave, though somewhat younger in age (ca. 8,000 years B.P.), is comparable in size to dogs from even younger sites in Utah such as Caldwell Village (Haag 1970). The specimen from Danger Cave may be representative of small-sized dogs, but it is unclear whether this individual had a short face, because the cranium was not recovered. However, the Danger Cave specimen may not be representative of early dog populations in the eastern Great Basin since no specimens of comparable size have been reported.

Colton (1970) used limb bone size to quantify the distinction between large and small breeds in a collection of prehistoric southwestern Indian dogs; large dogs were identified as those with femora over 160 mm. in length and humeri greater than 140 mm. While it could be argued that Colton's (1970) designation is artificial and that the size distinction of most aboriginal dog specimens approximates a continuum (Olsen 1985), these designations are employed here to simplify data presentation and facilitate relative comparisons among animals. Table 3 shows the greatest length of some limb bones of domesticated aboriginal dogs from the Great Basin and Southwest. Greatest length (GL) as used here is similar to that defined by Von den Dreisch (1976).

Short-limbed (small-sized) dogs occur at Caldwell Village and 42Ka1969 (Table 3). Note that these specimens are shorter than others found in Utah, but longer than those of dogs reported from Mancos Canyon, Colorado (Emslie 1978). Of the few diagnostic dog specimens found in Utah, most fall into the large-sized category. The Plains Indian dog, identified by Allen (1920), and the large-sized



Fig. 6. Skulls of dogs from Caldwell Village.

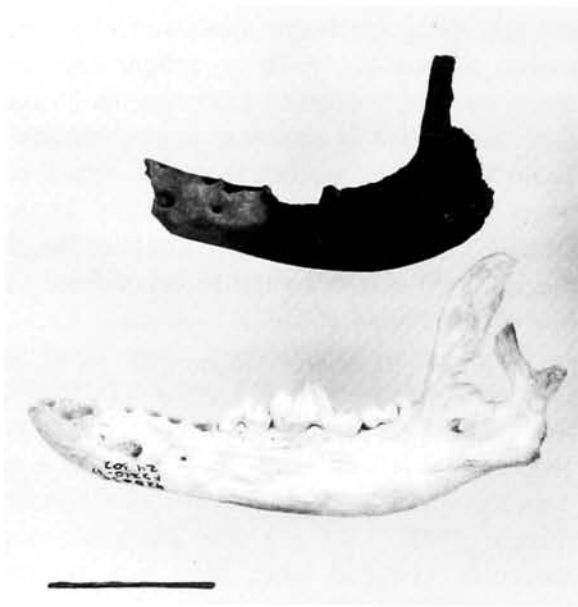


Fig. 7. Mandibles of dogs from Danger (upper) and Hogup (lower) caves (scale is 4 cm.).

Nevada dog identified by Dansie and Schmitt (1986; Vista Feature 48F), also fall within this size category (Table 3).

A third group of dogs that did not fit Colton's (1970) criteria was also identified. These specimens, referred to as medium-sized in Table 3, include a specimen from Pharo Village. Elements from this site were not available for examination, but are described by Haag (1968). A dog of similar proportions was recovered from the Vista site in Nevada (Dansie and Schmitt 1986; Feature 28; aka "Dick the dog"). Dansie and Schmitt (1986) described this specimen as small in stature, robustly built, and lacking the short face associated with some small breeds.

As noted, however, most of the diagnostic dog specimens in the eastern Great Basin fit into the category of large-sized dogs, which appear

Table 3
GREATEST LENGTH (mm.) OF LIMB BONES FROM DOGS AND WILD CANIDS
IN THE EASTERN GREAT BASIN AND OTHER PARTS OF NORTH AMERICA

Site/Specimen	Humerus	Radius	Ulna	Femur	Tibia
small-sized dogs	< 140			< 160	
Mancos Canyon, Colorado ^a	103.7	105.7	129.7	117.7	113.6
	103.3	108.3	129.2	115	116.3
	102.5	99.8	116.5	115.7	112.8
	110.3	108	110	121.6	119
Canyon del Muerte, Arizona ^b	114	115	140	125	122
42Un95, Utah ^c	139	133.5	166	155	146
42Un95, Utah ^c	119	122	149	135	130
42Ka1969, Utah	--	121.9	140.7	--	--
large-sized dogs	> 140			> 160	
Moundsville, Ohio ^d	168	164	--	170	172
	163	164	--	173	177
	162	163	--	--	160
	--	--	--	--	156
Pueblo del Arroyo, New Mexico ^b	156	153	188	172	165
Vista 2, Nevada ^e	175.5	--	--	184	--
42Ut808, Utah ^f	167	163	192	179	177
42Ut592, Utah	--	--	--	192	195
42Ws964, Utah	163	172	--	--	--
42Ws964, Utah	161	148	170	--	--
medium-sized dogs					
Vista 1, Nevada ^e	142.6	141	167.5	--	154.8
42Md180, Utah ^g	147	139	--	158	152

^a Emslie (1978).

^b Haag (1948).

^c Haag (1970).

^d Allen (1920).

^e Dansie and Schmitt (1986).

^f Janetski et al. (1992).

^g Haag (1968).

to have been widely and commonly distributed across North America. The only notable temporal change that can be identified by the limited data set described here is the appearance of hybridization with wild canids during the Late Prehistoric. A specimen from 42Ut592, a site on the northern shore of Utah Lake dating between A.D. 1330 and 1636 (Janetski 1990),

consists of a nearly complete skeleton of a juvenile wolf/dog hybrid. Based upon the degree of limb bone epiphyseal fusion, this individual was between 12 and 18 months old at the time of death (Amorosi 1989). As an additional caveat, evidence for the use of wild canids as possible pets by human populations also appears during the Late Prehistoric. An

intentional coyote burial from the Orbit Inn (42Bo120), a site dating between A.D. 1450 and 1500 (Simms and Heath 1990), may represent a tame coyote kept as a pet. The skull and limb bones of the coyote do display cutmarks resulting from skinning (e.g., Binford 1981) but none from butchering (Lupo MS).

Contexts of Recovery

Many of the dog remains recovered from sites in the western Great Basin were recovered from burial caves (Dansie 1984). Few of these represent purposeful interments, but the association with human burials is nonetheless striking. Other archaeological finds in the western Great Basin from open sites are more fragmentary in nature.

In the eastern Great Basin, dog burials are uncommon. A middle Archaic burial of a man and dog was recently recovered from the shore of Utah Lake (Janetski et al. 1992), and an undated burial from Payson, Utah (discovered in 1939 and reported by Jones 1961:76; also see Janetski et al. 1992) apparently contained a female human and a large dog. Unfortunately, the canid remains from this burial were unavailable for study, so the designation of domesticated dog remains open to question. The complete skeleton of a puppy recovered from Promontory Point Cave 2 (42Bo2) may represent an intentional burial. Based upon tooth eruption and the lack of epiphyseal fusion, this animal was probably less than six months old when it died (Amorosi 1989). The fact that a nearly complete skeleton was recovered suggests an intentional burial, but this was not reported by Steward (1937), and the stratigraphic position of this specimen remains unclear. Finally, Sharp (1992) reported that at least one of the dogs recovered from Nawthis Village may represent a burial.

As reported herein, canid skeletons from several sites in the eastern Great Basin (Orbit Inn, 42Ut878, 42Ut636, 42Ut592) have been

found in or near pits, often associated with other refuse. In all of these cases, the skeletons were complete or nearly so, and some of these remains displayed cutmarks resulting from hide removal. In each of these cases, the skeletal remains are from dog/wild canid hybrids, possible hybrids, or wild canids. These associations of skeletal remains in or near pits may represent intentional burials of hybrid or wild canid pets that were in some instances skinned prior to interment. A similar mode of skeletal treatment has also been documented for domesticated dogs. Dog skeletons have been found in pits mixed with other types of refuse in Utah (e.g., at 42Un95 and 42Ws964), although none of these remains displayed cutmarks.

However, many other dog and canid remains in the eastern Great Basin have been recovered from the fill and midden in archaeological sites where they often were associated with discarded food bones. Even though only a few of these remains also displayed cutmarks or burning related to food consumption, the context of recovery suggests their possible use as food or general lack of regard for their disposal.

ARCHAEOLOGICAL IMPLICATIONS

Why Are There So Few Dogs?

Even if all of the canid remains discussed here were unquestionably identified as domesticated dog, the number of individuals from archaeological sites in the eastern Great Basin remains fairly low. A different situation seems to exist in the western Great Basin, where dog skeletal remains are more common. Table 4 extrapolates the number of individual animals from Dansie's (1984, 1990) overviews of dog remains from selected sites in the western Great Basin; note the higher incidence of individual animals in this sample. As reported by Dansie (1990), these remains are common in wetland settings associated with Pyramid Lake, Lake Winnemucca, and Stillwater Marsh.

The paucity of dogs in the eastern Great Basin is especially evident when comparisons are made with the Southwest. For example, Emslie (1978) found a total of 20 whole or partial dog burials associated with three sites dating between A.D. 800 and 1150 in Mancos Canyon, Colorado, and Clark et al. (1987) reported a total of 49 dog bones recovered from at least 14 sites on the Dolores River Project. It is difficult to extrapolate numbers of individual animals from this count, but it is significant that most of these are half or partial mandibles. Further,

Nearly every Pueblo excavation in the southwestern United States has produced some evidence of the domestication of the dogs. The sites date from A.D. 1050 to A.D. 1273, and range in size from Cliff Palace Ruin in Mesa Verde National Park, Colorado with its multi-storied masonry construction of many rooms and great stone towers, to the more modest pueblos of fewer rooms at Keetseel and Betatakin in the area of Monument Valley, Arizona [Olsen 1985: 40].

A possible explanation for the low numbers of dogs in Utah may be underreporting in the literature. For example, the dog found at Promontory Point Cave 2 was never reported in the literature. There may be other examples as well, in particular specimens recovered from excavations in the 1950s and early 1960s, when faunal remains were routinely unidentified and/or underreported. Within the last two decades this situation has changed, but few domesticated dog remains have been reported by more recent investigations, and it is unlikely that the low numbers of dogs are solely attributable to underreporting in the literature.

An alternate explanation is that low populations of dogs were maintained in the eastern Great Basin during the Holocene. Ethnographic work conducted earlier in this century indicates that aboriginal dogs were scarce in some portions of the Great Basin (Kelly 1932; Stewart 1941). Stewart (1942:25) noted that coyotes were kept as pets by some Utes and Southern

Paiutes, but mentioned nothing of dogs. Kelly (1964:55, 86) reported that dogs were only recently acquired by the Kaibab Southern Paiute. No dogs are visible in Hiller's photos of Utes and Southern Utes (Fowler and Fowler 1971). Fowler (1989) also mentioned that dogs were not plentiful among the Northern Paiute from the Walker River and Pyramid Lake areas. However, dogs may have been more important among Shoshone groups in northern areas. For example, Russell (1965:26) described Sheep-eaters (Shoshone) in Yellowstone Park as having "about 30 dogs on which they carried their skins, clothing, provisions etc. on their hunting excursions." Steward mentioned that the Fort Hall Shoshone used about five dogs to hunt mountain sheep (Steward 1943:294, 295).

Estimates of prehistoric dog population densities based upon the zooarchaeological and fossil records can be misleading due to the biases inherent in faunal assemblages and taphonomic processes (e.g., Behrensmeyer and Dechant Boaz 1980; Klein and Cruz-Uribe 1984). Few intentional dog burials do not necessarily equate to low population densities, since this is but one way to dispose of a carcass (Schiffer 1987). In the case of dogs, skeletal elements recovered from middens, general fill, and pits suggested that a different disposal method was practiced. Even so, it is suspected that prehistoric dog populations in the eastern Great Basin were fairly low in the past. The rationale for this is based upon the following: (1) The numbers of dog skeletal remains recovered from archaeological excavations are fairly low; (2) many residential sites do not contain dog remains; and (3) there is no evidence (e.g., large numbers of juvenile or immature animals) indicating that dogs were ever intentionally bred.

Prehistoric Dog Utilization in the Great Basin

The relative paucity of dogs in the eastern Great Basin may be linked to the purposes they

Table 4
DISTRIBUTION AND ESTIMATED MNI OF DOGS FROM THE WESTERN GREAT BASIN
 (extrapolated from Dansie 1984, 1990)

Site	MNI ^a	Context
Winnemucca Lake		
Crypt Cave	3	one dog burial, two dogs associated with human skeleton
Earth Mother Cave	3	associated with human burials
Pyramid Lake		
Moose Cave	2	dog burials
Desiccation Cave	5	associated with human burials
26Wa292	1	general fill
26Wa315	1	general fill
Thea Heye Cave	3	midden and general fill
26Wa1018	2	midden
Other Sites		
Dangberg Site	1	unknown
Stillwater Marsh Sites	3	general fill
Vista Site	2	one dog burial, one skeleton from hearth
Lost City	8	dog burials

^a minimum number of individuals.

served. Ethnographic and historic accounts have documented that aboriginal dogs were employed in a variety of different tasks (Langkavel 1898; Walker and Frison 1982; Olsen 1985; Clutton-Brock 1989). Most significant was their use as beasts of burden and hunting aids. As beasts of burden, dogs can transport a variety of loads, including food and fuel, over long distances, thus reducing transport costs to humans. This would be particularly significant in circumstances where transport constraints were considerable, distances great, or the terrain difficult to traverse. The number of dogs required for transporting loads probably varied as a function of the type of load and the distance it was to be transported. Although the amount of available ethnographic information is limited, it suggests that at least some historic populations,

notably the Wind River and Yellowstone Shoshone, did use dogs for transporting loads (see Lowie 1924; Russell 1965). However, most information on the Northern Paiute, Southern Paiute, and Ute suggests that dogs were not used as pack animals but as hunting aids (Stewart 1941; Kelly 1964; Fowler 1989).

As hunting aids, dogs can reduce the search time involved in obtaining certain sized animals (e.g., Hawkes and O'Connell 1992). Dansie and Schmitt (1986:250) suggested that the large, long-limbed Nevada dogs were used to hunt and chase large prey. This is corroborated by a few ethnographic sources that mention dogs as aids for driving large-sized game such as deer, mountain sheep, and pronghorn antelope during communal hunts (Lowie 1924; Stewart 1941; Fowler 1989). In addition to large-sized game,

dogs were used to hunt smaller-sized prey such as prairie dogs and rabbits (Lowie 1924; Kelly 1964; Dansie 1984).

More recently, Dansie (1990) suggested that dogs also served to clean up or scavenge trash (notably subsistence refuse) that accumulated near human habitation sites, especially those in lacustrine or wetland habitats. In these environments, dogs could subsist on low-cost products in refuse middens by scavenging or by acquiring local food unaided. Dogs' ability to feed themselves by fishing, for example, has been reported elsewhere and apparently saves human populations the effort of feeding them (Langkavel 1898). An additional benefit to their human companions is that dogs may have served as food larders for lean times (Dansie 1990).

Dogs, Bone Attrition, and Faunal Assemblages

Low dog population densities have even more significant implications for the preservation of the archaeofaunas. Carnivores, especially canids, can strongly modify the content of bone assemblages originally produced by humans (Binford 1981; Kent 1981; Lyman 1984). Dogs scavenging human refuse can greatly reduce the numbers of bones originally deposited, especially those of smaller-sized taxa (Brain 1981; Walters 1984, 1985; Morey and Klippel 1991; Hudson 1993). Lyon (1970), for example, reported that dogs at Wachipaeri agricultural camps in Peru totally consumed small bone from fish, small birds, and mammals. Walters (1984) suggested that dogs delete up to 97% of the small-sized bones originally deposited by humans. Dogs also significantly modify the spatial arrangement of bone assemblages in the process of scavenging (e.g., Kent 1981, 1993). In order to avoid competition, dogs will move bones to isolated locales away from their original discard position. Although wild canids also modify bone assemblages, dogs have the advantage of co-habitation and im-

mediate access to garbage when it is disposed. Some wild canids may be discouraged from immediately scavenging refuse by the presence of people (Bunn et al. 1988; Lupo 1993) and may not ravage human-produced assemblages until after a site has been abandoned.

Low numbers of dogs suggest that attrition of faunal assemblages by these canids may be minimal. However, the patchy distribution of dogs in the eastern Great Basin indicates that the impacts of these canids may be significant in lacustrine habitats. The presence of dogs will especially influence the representation of smaller-sized resources (e.g., birds or fish) which are abundant in these habitats and commonly exploited by human populations. It is also possible that some human populations in the eastern Great Basin did not keep dogs; in these instances, post-discard scavenging of zooarchaeological assemblages may be solely attributable to wild canids.

SUMMARY

Data presented in this paper suggest that aboriginal domesticated dog populations were low in the eastern Great Basin. Clustering of skeletal remains in sites around Utah and Great Salt lakes and the overall scarcity elsewhere indicate that there was a patchy distribution of dogs in the region, with wetland habitats occasionally supporting abundant populations. Furthermore, it is entirely possible that dogs were absent from some portions of the Great Basin. Although there are obvious advantages associated with keeping dogs, large numbers of individual animals are not required. In concurrence with Dansie (1990), it is concluded that dogs may have been used as garbage disposals, as well as aids to their human cohabitants in hunting game and possibly other activities. Concentrations of dogs in wetland habitats may have been the result of their low maintenance costs and ability to feed themselves. In these environments, human populations could have intentionally or

unintentionally maintained low population densities of dogs with very little effort and for long periods of time.

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