

*Proceedings of the 9th Conference of the International Council
of Archaeozoology, Durham, August 2002*

Series Editors: Umberto Albarella, Keith Dobney and Peter Rowley-Conwy

Dogs and People in Social, Working, Economic or Symbolic Interaction

Edited by
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Oxbow Books

Published by
Oxbow Books, Park End Place, Oxford OX1 1HN

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ISBN 978 1 84217 124 0 1 84217 124 0

A CIP record for this book is available from The British Library

This book is available direct from
Oxbow Books, Park End Place, Oxford OX1 1HN
(*Phone: 01865-241249; Fax: 01865-794449*)

and

The David Brown Book Company
PO Box 511, Oakville, CT 06779, USA
(*Phone: 860-945-9329; Fax: 860-945-9468*)

and

via our website
www.oxbowbooks.com

Printed in Great Britain by
Short Run Press, Exeter

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Preface

Umberto Albarella, Keith Dobney and Peter Rowley-Conwy

This book is one of several volumes which form the published proceedings of the 9th meeting of the International Council of Archaeozoology (ICAZ), which was held in Durham (UK) 23rd–28th August 2002. ICAZ was founded in the early '70s and has ever since acted as the main international organisation for the study of animal remains from archaeological sites. The main international conferences are held every four years, and the Durham meeting – the largest ever – follows those in Hungary, the Netherlands, Poland, England (London), France, USA, Germany and Canada. The next meeting will be held in Mexico in 2006. The Durham conference – which was attended by about 500 delegates from 46 countries – was organised in 23 thematic sessions, which attracted, in addition to zooarchaeologists, scholars from related disciplines such as palaeoanthropology, archaeobotany, bone chemistry, genetics, mainstream archaeology etc.

The publication structure reflects that of the conference, each volume dealing with a different topic, be it methodological, ecological, palaeoeconomic, sociological, historical or anthropological (or a combination of these). This organisation by theme rather than by chronology or region, was chosen for two main reasons. The first is that we wanted to take the opportunity presented by such a large gathering of researchers from across the world to encourage international communication, and we thought that this could more easily be achieved through themes with world-wide relevance. The second is that we thought that, by tackling broad questions, zooarchaeologists would be more inclined to take a holistic approach and integrate their information with other sources of evidence. This also had the potential of attracting other specialists who shared an interest in that particular topic. We believe that our choice turned out to be correct for the conference, and helped substantially towards its success. For the

publication there is the added benefit of having a series of volumes that will be of interest far beyond the restricted circle of specialists on faunal remains. Readers from many different backgrounds, ranging from history to zoology, will certainly be interested in many of the fourteen volumes that will be published.

Due to the large number of sessions it would have been impractical to publish each as a separate volume, so some that had a common theme have been combined. Far from losing their main thematic focus, these volumes have the potential to attract a particularly wide and diverse readership. Because of these combinations (and because two other sessions will be published outside this series) it was therefore possible to reduce the original 24 sessions to 14 volumes. Publication of such a series is a remarkable undertaking, and we are very grateful to David Brown and Oxbow Books for agreeing to produce the volumes.

We would also like to take this opportunity to thank the University of Durham and the ICAZ Executive Committee for their support during the preparation of the conference, and all session organisers – now book editors – for all their hard work. Some of the conference administrative costs were covered by a generous grant provided by the British Academy. Further financial help came from the following sources: English Heritage, Rijksdienst voor het Oudheidkundig Bodemonderzoek (ROB), County Durham Development Office, University College Durham, Palaeoecology Research Services, Northern Archaeological Associates, Archaeological Services University of Durham (ASUD), and NYS Corporate Travel. Finally we are extremely grateful for the continued support of the Wellcome Trust and Arts and Humanities Research Board (AHRB) who, through their provision of Research Fellowships for Keith Dobney and Umberto Albarella, enabled us to undertake such a challenge.

1. History, Ethnography, and Archaeology of the Coast Salish Woolly-Dog

Russel L. Barsh, Joan Megan Jones, and Wayne Suttles

The indigenous Coast Salish peoples of Puget Sound and Georgia Strait (present day western Washington State and southwestern British Columbia) maintained a distinct phenotype of dog for the production of yarn. Blankets woven of dog hair, often mixed with waterfowl down or with hair from mountain goats, were important trade and gift items, essential to the accumulation of wealth and prestige. Lightweight but very labor-intensive, woven blankets represented wealth that could be transported easily in a coastal hunting and fishing society where seasonal mobility was necessary for survival (Suttles 1987). Dog-hair weaving disappeared quickly after the introduction of machine-made blankets by British and American trading companies in the early 19th century. Although many early explorers referred to woolly-dogs (Gunther 1972: 259–60; Howay 1918), the only depiction of a woolly-dog is of doubtful reliability, and woolly-dogs were reportedly extinct by the third quarter of the 19th century.

Archaeologists have attempted to reconstruct the appearance of the woolly-dog and its relationship to living breeds from osteological evidence (Crockford 1997; Koop et al. 2000), but there is no reliable method for distinguishing the remains of woolly-dogs from those of other Coast Salish dogs (i.e. pure-bred hunting dogs or unmanaged mixed-breed “village dogs”) in the absence of a type specimen. The recent re-discovery at the Smithsonian Institution’s National Museum of Natural History in Washington, D.C. of two Coast Salish dog specimens collected in 1859, one of them unquestionably a woolly-dog based on a comparison of its coat with dog-hair blankets collected in 1841 from the same geographic area, provides a unique opportunity to describe Coast Salish dogs phenotypically and trace their phylogenetic relationships.

Ethnohistory

Suttles (1951: 244–46) conducted extensive interviews of Northern Straits Salish people in the late 1940s. Although he obtained only a generic term for “dog”, *sqéxə*, he heard descriptions of two functional dog breeds: one used for hunting, the other used for its woolly hair. Similarly, the Twana-speaking peoples of southwestern Puget Sound reportedly maintained separate breeds for hunting and weaving (Elmendorf 1992: 94). Twana people referred to both kinds of dog as *sqwəbáyʔ* but sometimes distinguished the woolly-dog as *šiʔáʂʔalqaʔd* or “long-haired” (Elmendorf 1992: 96). The limited linguistic evidence suggests that there was relatively little morphological distinction between the two breeds apart from their coats.

Woolly-dogs frequently shared plank houses with people while hunting dogs were ordinarily kenneled outdoors (Suttles 1990: 460–62; Elmendorf 1992: 97). Hunting dogs and woolly-dogs may have been routinely separated to prevent them from interbreeding. It remains uncertain whether hunting dogs were ordinarily bred and trained by hunters (ordinarily men) and woolly-dogs by weavers (typically women). Julius Charles told Suttles that Charles’ older half-sister showed him how to make a dog into a good hunter. Dogs of both types were valued highly, and commanded high prices in trade. Dogs were given personal names, and were often buried ceremonially like humans (Elmendorf 1992: 99). An example of a young woman buried with a dog was recorded at Watmough Bight (45 SJ 280) on Lopez Island in 1968,

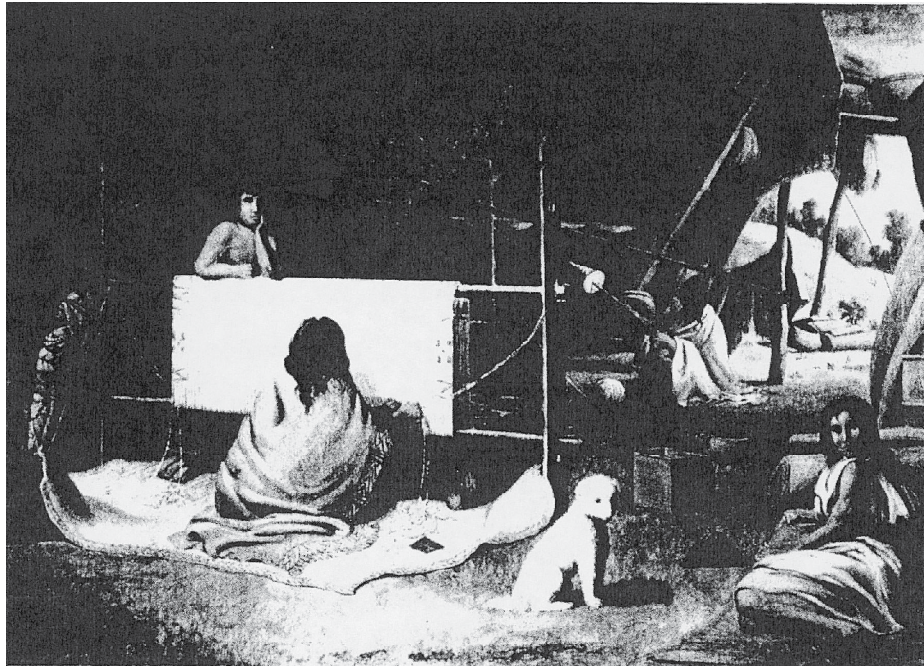


Fig. 1. Canadian artist Paul Kane's 1855 painting of a Clallam (S'Klallam) woman weaving a blanket with a woolly-dog sitting beside the loom, loosely based on sketches he made eight years earlier. Photograph of the original with permission of the Royal Ontario Museum © ROM

according to field notebooks of the excavations housed at the Burke Museum on the Seattle campus of the University of Washington.

Captain George Vancouver observed woolly-dogs at Port Orchard in the central Sound in 1792, "shorn as close to the skin as sheep are in England ... with very fine long hair," and compared them to large Pomeranians (Gunther 1972: 259). Later that year, the Spanish naval vessels *Sutil* and *Mexicana* visited a village located on Gabriola Island, and commented on "the great number of dogs they keep in their villages, most of which were shorn." The dogs were reported to be "of moderate size, resembling those of the English breed, very woolly, and usually white" (Howay 1918: 87). This description also appears in Wagner's (1933) translation of the official published Spanish account of the voyage in much the same form. It does not appear in Kendrick's (1991) translation of a presumed original manuscript from the voyage, however, so its precise source is obscure.

Simon Fraser observed shorn dogs and blankets made from goat and dog hair in 1806 (Lamb 1960). What he saw may have been very much like the soft white blankets brought back from northern Puget Sound by the 1841 U.S. Naval Exploring Expedition, now in the collection of the Smithsonian Institution's National Museum of Natural History (illustrated in Gustafson 1980; Wright 1991: 44–47).

In 1824, the seamen of the *William & Ann* observed that the Makah kept their woolly-dogs isolated "on a

little island a few miles from the coast" where they fed them every day (Young 1905: 196). Woolly-dogs were not always isolated, however. Joseph Whidbey and his party observed native people "walking along the shore" of Camano Island "attended by about forty dogs in a drove, shorn close to the skin like sheep" (Lamb 1984: 565). In 1828, James McMillan observed a flotilla of 160 Cowichan canoes on the Fraser River returning from fall salmon fishing upstream, each canoe with "about half a dozen dogs more resembling Cheviot Lambs shorn of their wool" (MacLachlan 1998: 5).

Canadian artist Paul Kane (1859) sketched Coast Salish people and their dogs in 1847, and described woolly-dogs with long black, brown, or white hair that was sheared with a knife (Eaton and Urbanek 1995: 103; see Fig. 1). One of Kane's later paintings, often reproduced as a standard for the morphology of woolly-dogs (Gustafson 1980), shows a small fluffy white dog that is much smaller than the animal in his original sketches or the specimen in the National Museum of Natural History. It is reasonable to accord greater reliability to Kane's earlier work, although the predominance of light colored yarns in surviving early 19th century weavings casts some doubt on his description.

Dog hair was reportedly combined with other animal and plant fibers. Dog hair and mountain goat wool were sometimes combined in one yarn, as well as being spun separately. Plant fibers such as the cotton from fireweed seedpods, thistles, and cattail heads were often reported

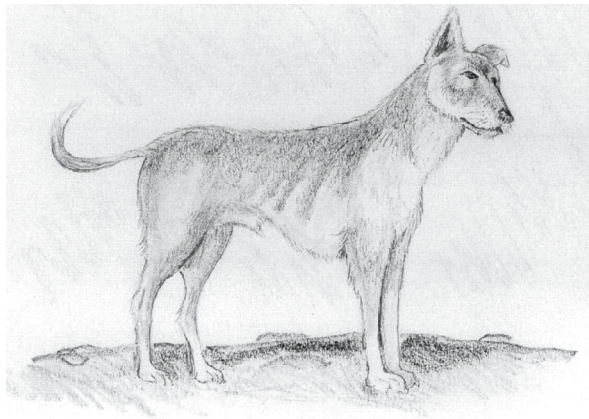


Fig. 2. Speculative reconstruction of a “village dog” by Cameron J. Pye for Crockford (1997), based on measurements of archaeological dogs and Paul Kane’s sketches and paintings. See Crockford and Pye (1997) for another version



Fig. 3. Two woolly-dogs by Cameron J. Pye for Crockford (1997), based on measurements of archaeological dogs and Paul Kane’s sketches and paintings. See Crockford and Pye (1997) for another version

as additions to the blends, along with bird down. The addition of other fibers would have extended the length of yarn that the spinner could produce from a limited supply of dog hair. Other fibers also enhanced the quality of the yarn; for example, we have found that adding bird down produces a particularly light, soft, warm and opulent textile. To display a blanket made of such a yarn would serve to emphasize the high rank and status of the weaver and the owner.

Dog hair yarn eventually succumbed to the influx of commercially manufactured trade blankets. Although the U.S. Indian Agent stationed near Bellingham, Washington, reported that native dress in the middle of the 19th century still included “blankets made of dog hair and feathers, of their own manufacture” (Fitzhugh 1858), field reports of woolly-dogs after 1860 are few. Franz Boas’ Kwakiutl assistant, George Hunt, reported seeing a woolly-dog with very fine, long hair when he was a boy in the late 19th century (Boas 1921: 1317–18). Canadian anthropologist Diamond Jenness (1934: 46) reported a dog of that description on the Saanich Reserve of southern Vancouver Island in 1936, still being shorn for yarn to knit mittens. Elmendorf (1992: 97) was told of a woolly-dog seen at LaPush on Washington’s Pacific Coast about 1920, and another woolly-dog at the Skokomish Reservation on Hood Canal in 1940. These isolated individuals may have differed considerably from early 19th century woolly-dogs.

Archaeology

Canid remains have been recovered from a large number of archaeological sites in Puget Sound and Georgia Strait, some as old as 4,000 BP. Crockford (1997) attempted to distinguish woolly-dogs from hunting dogs osteometrically

using incomplete skeletons of at least 647 individual dogs from 28 archaeological sites in the Coast Salish area, mainly in British Columbia. Her exhaustive measurements suggest a bimodal distribution in the sizes of individuals, somewhat less size variation amongst the smaller dogs, and a larger proportion of males amongst the larger dogs. The difference in mean size was relatively small (<20%), however, and the conclusion that the smaller individuals were woolly-dogs is based on a number of assumptions about prehistoric dog breeding and hunting, e.g. that hunting dogs needed to be larger and more robust. However, the only documented aboriginal Pacific Coast hunting breed, the Tahltan Bear Dog (Koop *et al.* 2000), was much smaller than the woolly-dog specimen we describe here. One of Elmendorf’s (1992: 97) Twana informants described Coast Salish hunting dogs as “small and thin, in coat and general build like a wire-haired terrier, with a ruff around the neck,” which is to say that is was similar in size to the Tahltan Bear Dog. According to people interviewed by Suttles, the “training” given to Coast Salish hunting dogs was mainly aimed at improving their sense of smell. This suggests that dogs were used to locate game, and not to bring it to ground. They would not need to be large or robust for this purpose.

Crockford and Pye’s (1997) reconstruction of the appearance of a woolly-dog and a “village dog” (Figs 2 and 3) is purely conjectural, and suggests a greater difference in size and build between the two types than is evident in the specimens at the National Museum of Natural History. Differences in hair length is a recessive trait in dogs (Ryder 2000), thus it is conceivable that the careful inbreeding of Coast Salish dogs produced lineages that differed little apart from the length and density of their coats.

Koop *et al.* (2000) extracted DNA from two intact dog

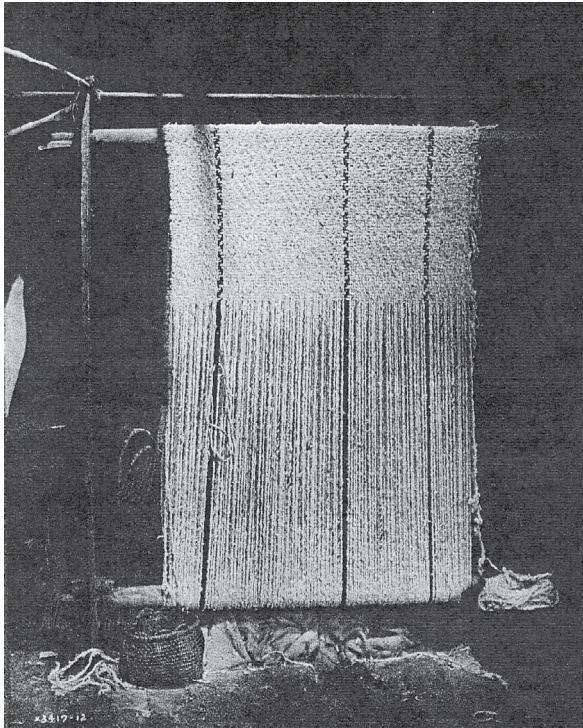


Fig. 4. Coast Salish loom with a twill-weave blanket, reportedly woven of goat hair, photographed by Edward S. Curtis in 1913. Note the basket of yarn at the foot of the loom. National Anthropological Archives, Smithsonian Institution (81-13446)

burials and an isolated dog bone recovered from archaeological sites on the lower Fraser River. It is unclear from their report why they classified one burial as a woolly-dog, and the other burial (as well as the isolated bone) as “village dogs”—these attributions appear to have been *post hoc* rationalizations of the disparate mtDNA results. The “village dog” specimens were most closely related to Yukon Wolf and Tahltan Bear Dog specimens, while a divergent group of specimens included the supposed woolly-dog and four living northeast Asian breeds (Ryukyu, Shikoku, Siberian Husky, and Mongolian).

If Coast Salish woolly-dogs have existed as a distinct breed for over 4,000 years as Crockford (1997) speculates, they may represent a relatively old lineage with stronger ties to Siberian dogs than to the New World wolves. A reliably documented woolly-dog specimen is required to test this possibility.

The National Museum specimens

Coast Salish weavings

We have located 13 Coast Salish weavings at the National Museum of Natural History: nine blankets, capes or robes, and four tumpline straps. The U.S. Navy’s 1841 expedition to Puget Sound (the Wilkes expedition) collected seven of the weavings, but did not fully identify their geographic origins or composition in the shipping documents (Peale 1846; Pickering 1841). Included are two spectacular blankets with red, dark blue, gray and brown geometric designs, one faded from exposure to sunlight (USNM catalog number E2124), and the other still bright (E1891A, originally cataloged as E2125 but for many years confused with E1891, a Navajo blanket collected in 1866). Peale’s (1846) catalog identifies them as “Blankets, made of the wool of the Rock Mountain sheep, by the natives of Puget Sound, Northwest Coast of America.” Krieger (1928) asserted that these two blankets contain a mixture of goat hair and dog hair, but did not explain how he arrived at this conclusion.

The Wilkes collection also includes two “robes” incorporating bird down (E1894) and strips of fur and cedar (E1895) into the weave, both identified as “Blankets, made of feathers, by the natives of the N.W. Coast of America” by Peale (1846); and four woven tumpline straps with herringbone designs (E2120, E2121, E2123), described by Peale as “Belt[s] made of the Rocky Mountain Goats wool, by the natives of the Northwest Coast of America.” Krieger (1928) described at least one of the straps (E2120) as a mixture of goat hair and dog hair, once again without explanation.

The geographical origins and eras of other Coast Salish weavings at NMNH are even less certain. One blanket fragment was rescued from artist George Catlin’s personal collection after his 1852 bankruptcy, and donated to the Smithsonian in 1879 (E177710). Catlin did not visit the Northwest, and it is unclear how or when he acquired this object. Krieger (1928) speculated that Lewis and Clark had originally collected this object when they traveled through Washington and Oregon in 1805–1806. A woven robe or cape with bird down (E221408), donated in 1903 by the widow of ethnologist Frank Cushing, came with no identifying notes and was originally mistakenly cataloged as Nez Perce art from Idaho. Krieger (1928) suspected that it was a weaving collected by George Gibbs in the 1850s, which Gibbs described in his notes as composed of goat hair, dog hair, and down.

Three woven blankets of more recent origin at the NMNH are identified only as “Cowichan”: E311257 is from the collection of the Smithsonian Institution’s Bureau of American Ethnology, established in 1879; E233950 was donated by Charles Buchanan, Superintendent of the Puget Sound Indian Agency in the first quarter of the 20th century; and E357408 was bequeathed by antiquities collector Victor Justice Evans (1865–1931). James Teit

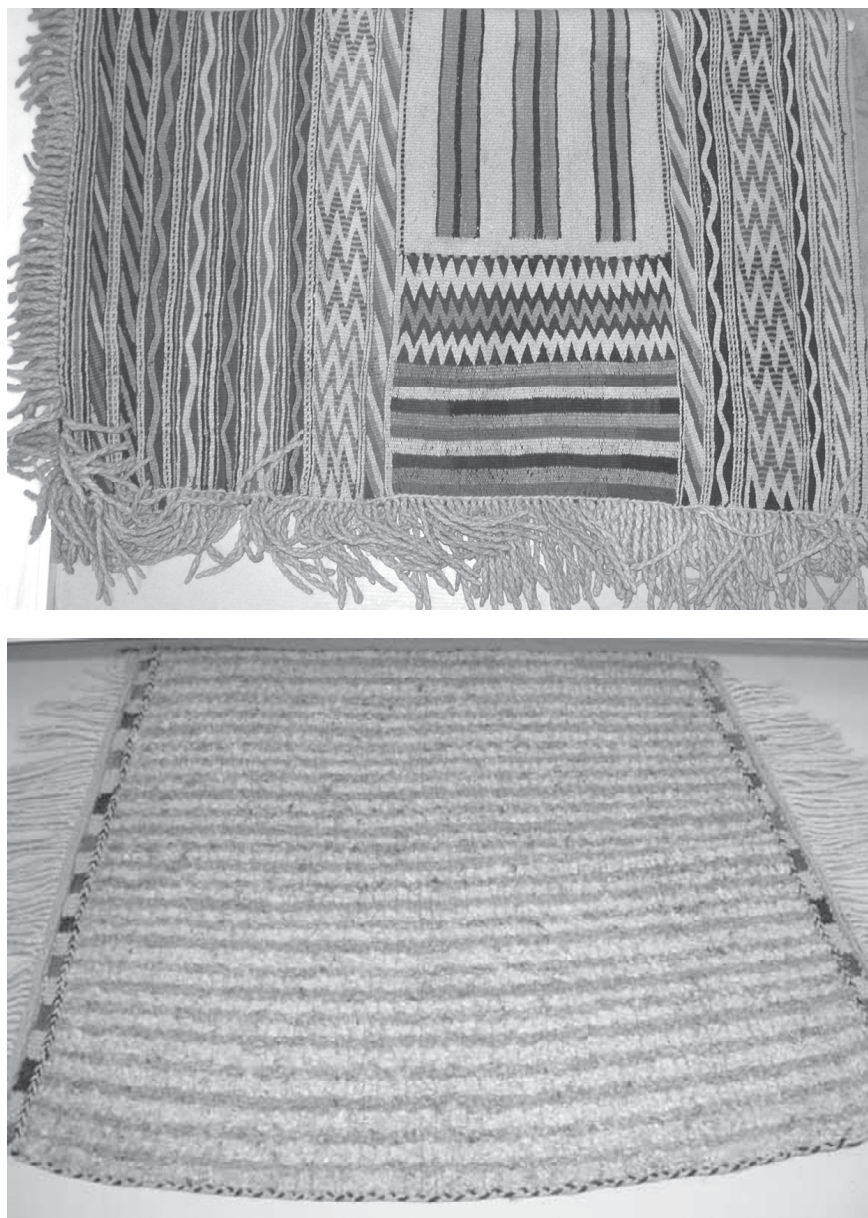


Fig. 5. Coast Salish twined blankets collected in 1841 by Lieutenant Charles Wilkes, commanding officer of the U.S. Exploring Expedition. The brightly colored blanket (NMNH Catalog Number E002124) was originally reported to contain a mixture of dog and goat hair. The ribbed blanket (NMNH Catalog Number E001894) is woven of yarns that incorporate bird down. Photographs courtesy of the Department of Anthropology, Smithsonian Institution; photograph by Repatriation Office staff

was the principal collector of British Columbia antiquities for the Smithsonian Institution as well as the American Museum of Natural History in the early 20th century (Teit 1930). If the Smithsonian acquired E311257 from Teit it could very well have been a product of the Cowichan people who live near Duncan on Vancouver Island. The term “Cowichan” has long been used in the Pacific Northwest as a generic term for all Coast Salish style knitting and weavings, however.

Two “Chilkat” (Tlingit)-style weavings that were probably *not* Coast Salish work also appear in the NMNH catalog: a black and yellow cape (E675) attributed to George Gibbs, secretary of the Indian Treaty Commission and Northwest Boundary Commission in the 1850s, and a blanket (E316360) from the personal collection of early 20th century international legal scholar Charles Hyde.

There have been no systematic microscopic or genetic analyses of the yarn blends in early Coast Salish weavings



Fig. 6. Pelt of George Gibbs' "famous Indian dog 'Mutton'" collected by naturalist C. B. R. Kennerly in 1859, in the collection of the Mammals Division, National Museum of Natural History, Smithsonian Institution, Catalog Number M4762. Photograph courtesy of the Division of Mammals, National Museum of Natural History, Smithsonian Institution; photograph by Repatriation Office staff

at the NMNH. Upon visual and tactile examination by the weaver in our team (Jones), the white twill woven blankets appeared to be woven from a heavy two-ply yarn of mountain goat wool (Fig. 4), while multi-color twined blankets appeared to contain various blended yarns (Fig. 5). The original Coast Salish weaver probably had a number of materials on hand, collected and traded, from which she could mix, blend, dye and spin different kinds of yarns. She may also have used yarn left over from previous projects. Each multi-colored twined weaving may well contain a unique mixture of different blended yarns, many or all of which include dog hair – very likely shorn from different dogs.

Schulting (1994) used stable carbon isotope ratios ($C_{13}:C_{12}$) to try to identify the source of the hair in a single Coast Salish blanket from British Columbia. Carbon isotope ratios can distinguish between different photosynthetic pathways, and between terrestrial and marine plants; distinctive ratios persist as plant-derived carbon moves on through the food chain. Schulting's data suggested an animal that gained a considerable amount of its protein from marine sources, and he found similar carbon isotope ratios in the remains of domestic dogs from archaeological sites. These results are consistent with historical and ethnographic accounts of Coast Salish people feeding dogs what they typically dined on themselves: fish. Other candidate sources of hair such as wild goats presumably ate little or no fish. The NMNH weavings have not been subjected to stable isotope ratio



Fig. 7. The Shiba Inu, photographed by J. Megan Jones, 2004

analysis to confirm the presence of dog hair. Furthermore, we believe that genetic analysis of the fibers in Coast Salish weavings will tell us more about the size and nature of the woolly dog population.

Woolly dog specimens

The specimens described below were independently re-discovered by one of the authors (Barsh) and by historian Candace Wellman, while each was tracing the fate of notes and specimens collected for the U.S. National Museum in the 1850s by American naturalist C. B. R. Kennerly.

Kennerly shipped two dog pelts and a skull to the U.S. National Museum in 1858–1859. On March 5, 1858, he wrote to museum curator Spencer Baird about the fate of the river otters he had collected at Semiahmoo Bay (near the present-day town of Blaine and the Lummi Indian Reservation):

... I had two nice skeletons of the otters, & packed them in a box with weights on the top, & intended to clean them in the morning when to my horror & chagrin the abominable Indian Dogs during the night got out the bones & gnawed them to pieces. In pay for this a beautiful skin of a large woolly Dog now hangs outside in a state of preparation for the Smithsonian Museum & as a warning to all others that may come around here without their owners with them [Baird 1833–1887].

This skin was assigned field number 106 and is now cataloged as USNM 3512. It is a medium sized dog with a relatively long, uniformly tawny coat. The undercoat does not match the material in the Smithsonian's 19th century Coast Salish weavings in either color or texture.

Kennerly had been in the Northwest barely a year, and had little direct contact with Coast Salish communities; local ethnography and linguistics had been left to his colleague George Gibbs, who had been Territorial Governor Isaac Stevens' secretary at the Indian treaty negotiations of 1854–1855. Kennerly may have mistaken a “village dog” for a woolly-dog. The original tag on USNM 3512 simply states: “Indian dog.”

Kennerly's notebook describes his field number 106 as: “Indian dog Skin & Skull Semiahmoo February 1858” (Kennerly 1858). “Skull” most likely refers to the *Canis* skull assigned catalog number USNM 3437, which we have been unable to locate in the Smithsonian Institution's collections. USNM 3437 has subsequently been confused with a second dog skull sent to the National Museum by Kennerly a year later, in 1859.

A packing list sent to the museum with one of Kennerly's shipments of specimens includes field number 327 “Canis-skull Chiloweyuck Depot July [1859] This is the wooly dog which the Indians shear & use the hair for making blankets, generally mixing it with the wool of the mountain goat” (Kennerly 1859). Farther down the same list is field number 406: “Mr G[ibbs]'s dog ‘Mutton’ Chiloweyuck Indians [September 1859]”. We have found no notebook entry or letter describing the circumstances in which Kennerly acquired the “Canis-skull” originally numbered 327, which is now USNM 3820. The original Smithsonian catalog entry is 3671, but refers to field number 327 as “*skin* and skull” [emphasis added], which must be mistaken.

Fortunately, a better record of the provenance of field number 406 has survived. On August 19, 1859, Kennerly wrote to Baird:

We got another splendid goat skin which was sent to Camp Skagit where Mr. Gibbs happened to be & he took charge of it; but most unfortunately his famous Indian dog “Mutton” got at it and ate the head off. He sent it to me yesterday & when I opened the bag & saw the injury I could almost have cried. Mutton was sheared a short time ago, & as soon as his hair grows out we will make a specimen of him [Baird 1833–1887].

Kennerly's reference to shearing indicates that Mutton was a woolly-dog. Our visual examination of field number 406, now cataloged as USNM 4762, confirms this conclusion (Fig. 6). He is approximately the same size as USNM 3512, the dog that Kennerly mistakenly identified as a woolly-dog. However, Mutton has a pure white, very dense coat, with unusually long guard hairs and an exceptionally fine, dense undercoat of woolly or cotton-like appearance, perfectly matching the fine frizzy fibers found in 19th century Coast Salish dog hair blankets. The original Smithsonian catalog contains a note that this is “The dog whose hair is used by the Indians in manufacturing of blankets”.



Fig. 8. *The American Eskimo*, photographed 2004 by J. Megan Jones, 2004

Mutton's geographical origin remains unclear. The original tag on USNM 4762 reads: “Indian Dog ‘Mutton’ Chiloweyuck Depot G. Gibbs”. The town of Chilliwack on the Fraser River, about 75 km east of Vancouver, British Columbia, derives its name from *sčəlxwíq̓w*, the name of the Halkomelem-speaking Coast Salish people of the area (Suttles 1990: 455). Kennerly did considerable collecting in southwest British Columbia using “Chiloweyuck Depot” as a forward camp (Kennerly 1858). Gibbs also spent time there with Kennerly, and it is plausible that Mutton was bred nearby. First Nations of the Chilliwack area today regard themselves as part of the Stalo or Sto:lo Nation; see Carlson (2001). Further archival research may reveal Mutton's precise origins.

Robert Fleischer and his students at the Smithsonian Institution's National Zoo have collected tissue from the National Museum of Natural History's woolly-dog specimen at our request, for genetic comparison with other Old World and New World dogs (see Leonard *et al.* 2002), but at the time of this writing they had not yet completed their analysis.

Similar present-day dogs and the reproduction of Coast Salish weaving techniques

Early explorers compared Coast Salish woolly-dogs with European spitz dog breeds, characterized by triangular upright ears on a fox-like head, a bushy tail curled over the back, a compact sturdy build and heavy, double coat (see e.g. “Finnish Spitz,” American Kennel Club 2003). The European spitz shares a number of characteristics with “northern” breeds that were not yet familiar to Europeans in Vancouver's time, such as the Malamute, Samoyed, Husky, and Eskimo: upright pointed ears, tail

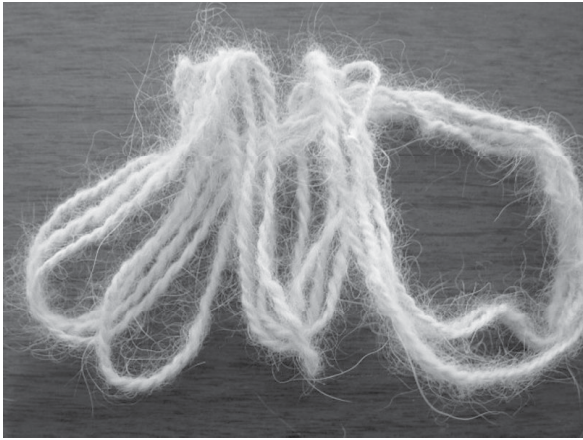


Fig. 9. Two-ply yarn spun from dog hair (American Eskimo), spun and photographed by J. Megan Jones, 2004

curled forward over the back and a compact sturdy body with shoulders larger and higher than the hips. At least some of these dogs also fit Kane's description of howling rather than barking. A crucial shared characteristic of spitz-like breeds is the double coat, consisting of a very dense undercoat and thick layer of denser guard hairs. This adaptation to cold climates tends to be associated with seasonal molts, resembling the molts of sheep.

Coast Salish methods of blending and spinning yarns on a rolling spindle have been described (e.g. Elmendorf 1992; Gunther 1972; Suttles 1990) and one of us (Jones) has reproduced them using hair from three modern spitz-type breeds Samoyed, American Eskimo, and Shiba Inu. The latter two breeds most closely resemble the size, shape and proportions assumed for the Coast Salish woolly-dog. The specimen Koop *et al.* (2000) regarded as a woolly-dog was more closely related genetically to the Siberian Husky than the Shiba Inu in their sample of living dog breeds, but it may not have been a woolly-dog at all for the reasons discussed above. The Samoyed was not included in Koop *et al.*'s study.

The Shiba Inu (Fig. 7) is the smallest of the living Japanese breeds and is believed to be a direct descendant of ancient Japanese dogs of the Jomon period (up to 8,000 BP), isolated geographically for centuries on small islands and rugged mountain ranges (Ishiguro *et al.* 2000). While Shibas are currently bred for a short coat, longhaired pups are also known. Both long- and short-haired Shibas have dense woolly undercoats that they shed twice each year. The "throwing" of the undercoat takes about a week. It begins with woolly tufts of hair forming at the hips and moves progressively towards the head. The loose hair can be combed out several times each day, but this is laborious and does not recover all of the shed hair. More "wool" can be saved if the dogs are

sheared at the beginning of the molt. Complete re-growth of the undercoat takes four to six months. According to historical sources (e.g. Elmendorf 1992; Gunther 1972; Howay 1918; Lamb 1960), Coast Salish woolly-dogs were sheared twice a year. The Shiba Inu occasionally produces longhaired offspring that look very much like Mutton.

The Samoyed also produces a dense woolly undercoat and molts seasonally like the Shiba Inu, but the average Samoyed is much larger in size than the Shiba Inu or Mutton. The American Eskimo dog (Fig. 8) better fits the size, shape, and coat type of Mutton. It is a hardy northern spitz type with a dense undercoat and longer silky outer hairs, all of which spin well. Both the Samoyed and American Eskimo lack the coarse, stiff guard hairs of other breeds, which would compromise the luxurious quality of a yarn spun from their coats.

Several blends and combinations of fibers were tried and all proved to be easy to handle on either the traditional spindle whorl or a modern spinning wheel. The hair was spun and then made into a two-ply yarn that is strong and durable, but also with the soft "hand" characteristic of dog hair. Blends with bird down and plant fibers were also spun and plied (see Figs 9, 10, and 11). An experienced spinner has no difficulty working with these fibers. Gustafson's (1980) statements that "canine hair, no matter from what breed is not a good spinning fiber" and that dog hair yarn exhibits "low tensile strength" are demonstrably in error. Hair from almost any breed of double-coated dog can be spun into acceptable yarn. Breeds vary in the quality of their hair, and individual dogs vary in hair quality depending on diet, overall health, and care. Nevertheless, our research has shown that strong, fine yarns can be spun from dog hair alone, or in combination with a variety of plant and animal fibers.

Discussion and the direction of future research

Our experiments with spinning dog hair raise an important question. Did Coast Salish woolly-dogs comprise a single genetically distinct lineage – that is to say, a true "breed" of dog – or were they simply well maintained, longhaired individuals of mixed and largely indeterminate ancestry? Genetic comparison of a single confirmed specimen (Mutton) with living breeds cannot answer this question; a larger sample of woolly-dogs would be required for reconstruction of the genetic diversity of the population. The best potential source of population level data is hair from Coast Salish weavings preserved in the collections of the Smithsonian Institutions National Museum of Natural History, which should represent a random selection of Coast Salish woolly-dogs living in the early 19th century. We have identified 14 items in the museum's collection that were acquired early enough to be likely to contain at least some dog hairs (E000675, E001891A, E001894, E001895, E002120, E002121, E002122, E002123, E002124, E002125, E177710, E221408,



Fig. 10. Two-ply yarn spun from roughly equal proportions of dog hair (Shiba Inu) and bird down, spun and photographed by J. Megan Jones, 2004



Fig. 11. Two-ply yarn spun from roughly equal proportions of dog hair (Samoyed) and mountain goat wool, spun and photographed by J. Megan Jones, 2004

E233950, E311257). Eight of these weavings were collected by the 1841 U.S. Navy Exploring Expedition, and can be reasonably attributed to Puget Sound provenances.

There is reason to doubt that there was ever any one “breed” of woolly-dog. The sole function of woolly-dogs in Coast Salish society was to produce hair for spinning. Woolly-dogs were separated from other dogs, and not used as hunters, herders, guards, burden haulers, or as food. According to Elmendorf (1992), furthermore, woolly-dogs were not simply thrown scraps of food or left to forage through refuse: they were given a special diet of salmon and elk, which presumably ensured the consistency, quality, and quantity of the spinning fiber. From a weaver’s perspective, the value of a particular dog would have been entirely a matter of coat quality: the length, strength, softness, fullness and light color of the hair. Body type, stance, and other traits that preoccupy modern-day breeders would probably have been of little interest to weavers. Assuming that the owner of the dogs was also the spinner and weaver, coat quality would have been the primary criterion applied to breeding decisions as well.

Since the key characteristic of interest to weavers (hair and coat structure) are shared by a number of different living spitz-like breeds, it is reasonable to suppose that Coast Salish weavers both maintained somewhat idiosyncratically local lines of woolly-dogs, and that they traded dogs and recombined lineages. At any moment in time, some local similarities may have been discernible in dogs from different plank houses (perhaps even from different weavers’ flocks), but only against the background of even greater variation at the individual level across the entire regional population of woolly-dogs. Individual level variation would have included all the

characteristics that are preserved osteologically and have been used by archaeologists to identify Coast Salish dog types: size and build, but not coat structure.

Conclusions

Specimen USNM 4762, the pelt of “Mutton” acquired by George Gibbs some time prior to 1859, likely in British Columbia’s lower Fraser River Valley, is the only confirmed specimen of the Coast Salish woolly-dog in the Smithsonian Institution’s collections, and probably the only specimen of the skin and coat of this prehistoric Native American breed still in existence. It resembles the infrequently seen longhaired offspring of the ancient Japanese breed Shiba Inu, larger and more robust than the woolly-dog has previously been supposed. In its size and build, but not its coat, it also resembles USNM 3512, an Indian “village dog” from Semiahmoo Bay, about 75 km distant from the origin attributed to USNM 4762. The hair of USNM 4762, but not the hair of USNM 3512, is consistent with the fibers found in the Smithsonian Institution examples of dog-hair blankets woven in the same geographic area in the 1840s and 1850s. Genetic comparison of USNM 4762 with living dog breeds may confirm its close relationship with northern spitz-like dogs such as the American Eskimo and Shiba Inu, which produce individuals with similar coat characteristics. Only a population-level analysis based on DNA extracted from hairs in the earliest surviving examples of Coast Salish weavings will determine whether the woolly-dog was a distinct “breed,” however, or simply a widely recurring coat-type phenotype crosscutting all aboriginal Coast Salish dogs.

Authors' affiliations and acknowledgements

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