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Social and Ritual Determinants of Whale Bone Transport at a Classic Thule Winter Site in the Canadian Arctic

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ABSTRACT Recent research has demonstrated that patterning related to harvesting selectivity and architectural bone utilization persists in the surface distribution of bowhead whale (*Balaena mysticetus*) bones at classic Thule sites in the Canadian central Arctic, despite scavenging by later non-whaling Inuit groups. Since skeletal riders with minimal architectural or artifactual utility are associated with carcass portions that were socially and ritually prized ethnographically in North Alaska, this surface record may also preserve spatial structure relating to loci of high status settlement and/or ceremonial activity within sites. Close to 3400 bowhead bones were mapped at the major Thule winter village of Qariaraqyuk, southeast Somerset Island. The results of a principal components analysis of the element distributions are consistent with expectations for special treatment of bowhead flippers, tails, and tongues. These results are supported by excavation data which reveal that flipper and tongue bones were preferentially discarded in the vicinity of wealthy whaling households and a major ceremonial structure. Contrary to the longstanding belief that Thule whale bone assemblages are hopelessly compromised by prehistoric and historic bone transport, these assemblages hold great promise for investigating Thule social and ritual practices. Copyright © 2002 John Wiley & Sons, Ltd.

Key words: bone transport; social status; ritual; bowhead whale (*Balaena mysticetus*); Thule Inuit; spatial analysis

Introduction

One of the definitive features of the classic Thule culture was the great emphasis on the harvesting of bowhead whales (*Balaena mysticetus*), the preferred yearlings of which averaged 8 m in length and weighed about 7 tonnes. Although not all groups whaled, all participated in a vigorous inter-regional exchange network that was ultimately underwritten by whaling surpluses (Whitridge, 1999a). This economic pattern first appeared in the eastern Arctic with the arrival of Thule migrants from North Alaska between AD 1000 and 1200, and it fell into severe decline at the classic-modified Thule transition (ca. AD 1400–1500) with the abandonment of many of the prime whaling areas. These few centuries of intensive whaling littered the beaches of the Canadian central and high Arctic with bowhead bones (McCartney, 1979). In a region where even driftwood is scarce, these bones represented a valuable resource that was heavily exploited for manufacturing house frameworks, sled runners, and a host of small utensils. Since soil formation is negligible and whale bone can survive on the ground surface for millennia, much of the bone generated by classic Thule whaling remained available to be scavenged by modified Thule and historic Inuit groups for many of the same purposes, and has even been heavily utilized in recent times by Inuit involved in the carving industry.

The multiple uses and potentially complex taphonomic history of whale bone has in the

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past lead many Thule archaeologists to dismiss the possibility of extracting much useful information from it, and so bowheads are usually excluded from economic or dietary calculations based on animal bone frequencies. However, Savelle and McCartney have demonstrated that strong patterning exists in the osteometrics and element distributions of surface whale bone at the regional and inter-regional scales, with respect to such things as prey selection (Savelle & McCartney, 1991; McCartney & Savelle, 1993) and zones of differential harvesting success (Savelle & McCartney, 1994; Savelle, 2000). Structure can also be observed at the local or site level, where element distributions conform to expectations derived from an architectural utility index, (Savelle, 1997).

While architectural and artifactual utility were probably the most important determinants of bone transport, some of the smaller elements likely travelled as riders inside larger butchery units. Among the historic Inupiat whalers of North Alaska, descendants of the same groups that gave rise to the eastern Thule migration, conventional butchery units were ranked, and allotted to participants in a whale kill according to formal sharing schemes. Because some of the most highly ranked units contain skeletal riders, status-based access to shares of the whale harvest may produce a signature in the whale bone distribution. This paper reports an attempt to discern such socially or ritually inflected patterning in the distribution of surface whale bone at the large classic Thule winter village site of Qariaraqyuk (PaJs-2), in the central Canadian Arctic. Since the closest ethnographic analogue for Thule whaling is that practised by the North Alaskan Inupiat, an outline of relevant features of the latter is provided in the next section, followed by an overview of archaeological knowledge of Thule whaling in the study area, and analysis of the whale bone assemblage from Qariaraqyuk.

North Alaskan Whaling

Inupiat whaling was organized on the basis of boat crews assembled by wealthy boat captains, or *umialit* (sing. *umialik*, literally 'boat owner', but better glossed as 'rich man'; Vanstone, 1962). The statuses of *umialik* and *umialik*'s wife were akin to formal ranks in North Alaskan societies. Though anyone could aspire to the position, it took years for a household to accumulate the knowledge, resources and social credit that would allow the prospective *umialik* to recruit crew members, acquire a skin boat, and mount a viable whale hunt (Burch, 1975; Spencer, 1959). He was expected to lavish gifts on crew members outside the whaling season, demonstrate generosity in the community at large, and participate in competitive feasts, all of which meant he and his wife had to be skilled traders and managers of wealth. Although an arduous and risky career trajectory, the successful *umialik* commanded the largest shares of the whale harvest, amassed great wealth and prestige, and "had his choice of all that was good" (Burch, 1975). His wife held comparable power and prestige in women's spheres of activity, within a heterarchically arranged socioeconomic field (Ellanna & Sherrod, 1995; Bodenhorn, 1990).

The six to nine person whaling crew was composed of a helmsman (normally the *umialik* himself), a harpooner, and several paddlers, with youths and women to maintain the whaling camp and occasionally serve as paddlers themselves. A crew was ideally drawn from an *umialik*'s close kin but non-kin were also recruited, especially into the highly skilled role of harpooner. Along with crew membership came membership in the ceremonial house or *karigi* (pl. *kariyit*) built and owned by one or more *umialit*. These structures functioned as men's workshops and social clubs much of the time, but were also used for community recreation and ritual (Larson, 1995). Most important rites and festivals were held in or adjacent to *kariyit*, (Spencer, 1959; Rainey, 1947).

The major whaling season occurred during the migration of bowheads north through the shore leads that form in spring along the northwest Alaskan coast, with a minor fall open water whaling season in some areas. Large whaling communities existed at the points of land most convenient to the normal lead configuration. Crews dragged their *umiat* (sing. *umiak*, open skin boats) and gear to the ice edge to watch for whales, launching the boats when one was sighted. Crews cooperated in harpooning the whale, attaching seal skin floats and drags that would tire it and eventually allow it to be lanced through a vital organ. Several crews joined together to

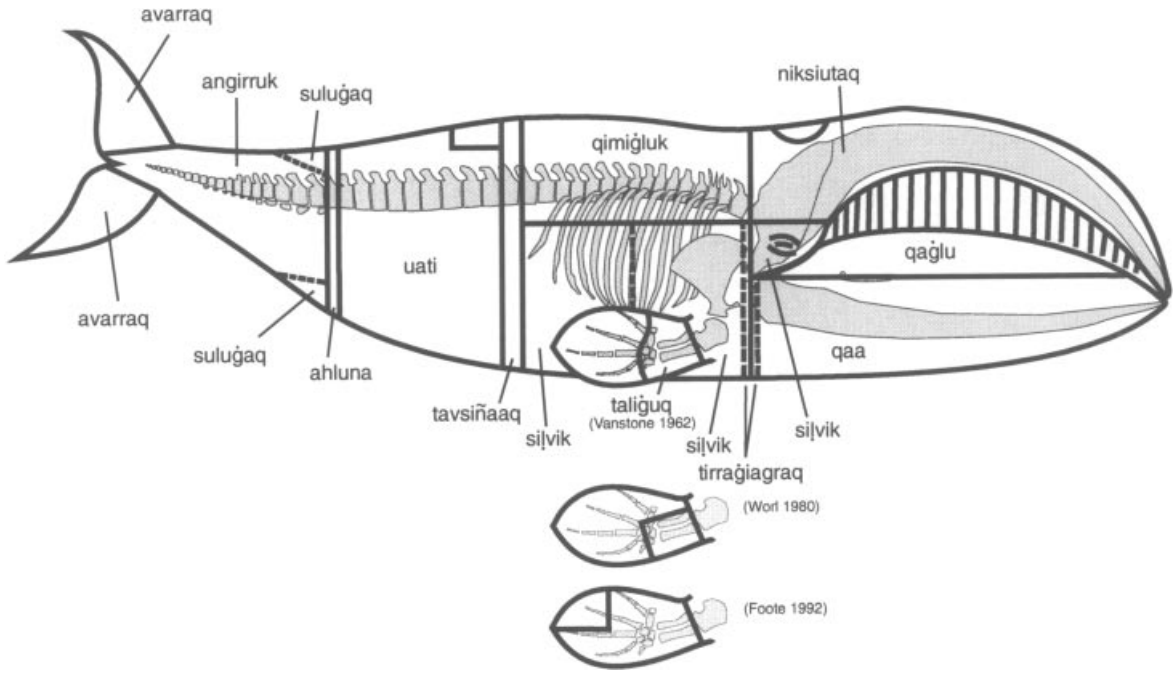

Figure 1. Proposed relationship between traditional carcass divisions at Point Hope, northwest Alaska, and bowhead skeletal structure. Divisions follow Foote (1992), except as noted for alternate versions of the flipper unit, for which Vanstone's (1962) makes the most anatomical sense.

tow the animal to a flensing site on stable ice, the entire community turning out to butcher the whale before it rotted from within. Shares were marked on the carcass (Figure 1) and allotted to crews based on their priority in killing and towing the whale (eight crews being the ideal), and to individuals based on their role and seniority within the crew.

The specific ranking of carcass portions varied slightly between communities and over time. The *umialik* credited with the kill (i.e. the one whose crew planted the first harpoon in the whale) normally received the rear portion of the carcass, from flukes to navel. He distributed much of the tail portion (which includes distal caudal vertebrae) among the community at spring and fall whaling feasts. By most ethnographic accounts the flippers were the most highly ranked carcass portion and also part of the first *umialik*'s share, (Spencer, 1959; Worl, 1980; Foote, 1992; Lowenstein, 1993) more rarely that of the second and third boats (Vanstone, 1962; Rainey, 1947). A distinction was sometimes made between the proximal portion, likely including the radius and ulna, and the distal portion, including the phalanges, with the latter allotted to the *umialik* and the former made a gift to a respected member of the first, second, or third boat crews. The *umialik* distributed parts of the cooked flipper during post-whaling festivities, (Spencer, 1959; Worl, 1980) but this may have consisted only of *maktak* (skin) and attached blubber. The humerus appears to have fallen in the adjacent *silvik* butchery unit, allotted to the second and third boats, although Spencer (1959) reports that the flipper portion was removed "together with the skin and the flesh under and behind the flipper", which may have included the humerus (an articulated humerus, radius and ulna were excavated from the entrance tunnel of a house at Qariaraqyuk). Alternatively, it may have been cleaned of flesh and disposed of with the larger bones. The tongue, including the hyoids, has gone to the fourth and fifth boats in recent years, (Worl, 1980; Foote, 1992) but Lowenstein (1993) indicates that it was traditionally part of the first *umialik*'s share. The rest of the skeleton was defleshed and disposed of independently of food shares. Ethnographically,

Tigara whalers are reported to have ceremonially returned the skull to the sea, believing it to contain the whale's soul (Rainey, 1947). However, in other parts of North Alaska historically, and in all major whaling locales prehistorically, crania were not infrequently incorporated as prominent architectural elements of houses and *kariyit* (Sheehan, 1990, 1997; Savelle & McCartney, nd). The first *umialik* formerly claimed all other bones (Lowenstein, 1993) but in historic times only the mandibles appear to have been consistently desired, as symbolically resonant construction elements for such things as houses, scaffoldings, and grave markers (Lowenstein, 1992).

In summary, all of the small bowhead elements that are potential skeletal riders are associated with relatively highly ranked butchery units. Distal flipper bones (phalanges) and distal caudal vertebrae are associated with the butchery units most consistently allocated to successful *umialit*, but these portions were also communally consumed or distributed in ceremonies held at the *karigi* or the *umialik*'s dwelling. These elements thus connote both social position and sanctity, with the distal flipper in particular having "ritual prominence" (Lowenstein, 1993). Spencer further notes that phalanges were sometimes utilized as whaling charms (Spencer, 1959) (a phalanx with a drilled suspension hole was recovered from a classic Thule house at Port Leopold; Whitridge, 1992). It appears that the proximal flipper bones (radius and ulna) were ranked somewhat lower than phalanges, and the humerus was likely lower still, if indeed it was not defleshed and abandoned at the flensing locale. Hyoids were associated with a carcass portion of high or moderate rank, but lack a specific ritual association in the ethnographic literature reviewed here.

Thule whaling and whale bone use

The first whaling communities in the Canadian Arctic were small pioneering Thule settlements, well-dated to about AD 1000 at the Nelson River site (Arnold, 1986). They appear to represent an exploratory movement into the eastern Arctic following closely on the Birnirk/Thule transition in North Alaska, and were probably associated with relatively mobile and small-scale open water whaling unlike that practised historically in North Alaska (McGhee, 1969/70). Large sedentary whaling communities emerged in the latter region around AD 1200, (Sheehan, 1997) and at about the same time along the Canadian central and high Arctic channels, likely reflecting a second phase of Thule migration out of the western Arctic (Whitridge, 1999b). These sites differ from the earliest Thule sites in size, and in possessing non-dwelling features that appear to have functioned like the historic North Alaskan *karigi*, as men's workshops and centres of community ceremonial (McCullough, 1989; Habu & Savelle, 1994). The implication that classic Thule groups possessed *karigi*-based whaling crews is borne out by strong modalities in Thule winter site size that correspond demographically to increments of boatloads of hunters (Whitridge, 1999b). Large Thule winter villages also possess house groups, frequently in association with *kariyit*, similar to the residential complexes or *upsiksui* utilized by the corporate kin groups that provided the core of the whaling crew in North Alaska (Whitridge, 1996, 1999b). Historic Inupiat whaling appears sufficiently similar to that practised by classic Thule groups, down to the use of such specific ritual items as whale tail pendants and ivory chains, to warrant the hypothesis that carcass use was also similar.

Savelle and McCartney have investigated the organization of classic Thule subsistence-settlement systems in the central Arctic, concentrating on the southeast coast of Somerset Island. This region accounts for some 40% of all the surface bowhead whale bone in the Canadian Arctic (McCartney, 1979). Clusters of large winter villages occur at Creswell Bay and Hazard Inlet, with the large village of Cape Garry mid-way between. The coasts within about 10 km of these major settlement loci are lined with dozens of temporary residential sites (consisting of three or more light dwellings), and thousands of caches (Savelle & McCartney, 1988). A virtually continuous scatter of whale bone from bowhead flensing activities occurs on the beaches within these zones. At a radius of about 20 km caches, temporary residential sites, and flensing locations fall off, and temporary field camps (consisting of only one to two dwellings) predominate. This systematic arrangement of functionally distinct site types suggests

that large whaling communities had established zones of economic interest—logistical territories—within which harvesting operations were deployed (Savelle & McCartney, 1988). The efficiency of this system is reflected in the greater overall whaling success, and greater selectivity for small individuals, at southeast Somerset sites than anywhere else in the central Arctic (Savelle & McCartney, 1994; Savelle, 2000).

Southern Prince Regent Inlet represents the major southwestern terminus in the migration of the Davis Strait bowhead stock, whales arriving in this area as open water conditions begin to prevail. Thule whaling in this region would thus have been shore-based. Savelle analysed element frequencies for a variety of feature types in the vicinity of the winter village of PaJs-13, including winter dwellings and processing locales (Savelle, 1997). Given the abundance at the latter of elements that occur in relatively low frequencies in dwellings, notably vertebrae and humeri, Savelle suggests that large portions of bowhead carcasses were hauled onto the beach for their anticipated architectural utility. This may also have been done to facilitate thorough processing. Wastage of any potentially useful part of a game animal was traditionally considered a major transgression by Inuit groups. Even bulky crania appear to have been consistently brought onshore, rather than being ritually discarded at sea as at Tigara. Elements with the greatest utility for house construction and artifact manufacture were then preferentially transported to the residential site. Hyoids, likely riders with the tongue carcass portion, are notably abundant in residential contexts, but radii and ulnae are only slightly less uncommon there than at processing sites. This underrepresentation of elements with negligible nutritional, architectural, and artifactual utility, but potential social and ritual significance, suggests disposal in distinctive contexts, and perhaps even offsite transport.

Analysis of the surface whale bone assemblage from Qariaraqyuk

Unlike PaJs-13, which is located on the open coast of Prince Regent Inlet in the midst of the major regional concentration of processing sites, the winter village of Qariaraqyuk is situated at least 5 km from the nearest likely flensing location. Because of its large size, and surface evidence of intensive whaling, it was selected for a three year research project into emergent complexity in a Thule whaling society (Whitridge, 1999b), as part of which data were collected on the surface whale bone distribution. The site consists of a row of approximately 57 winter houses on a raised beach ridge in the lee of Mount Oliver, with associated clusters of tent rings, *qarmat*, caches and hearths close to the shore of Hazard Inlet (Figure 2). The tents, and more heavily constructed *qarmat*, were probably occupied briefly during the spring, when the winter houses became uncomfortable, and again in the fall when the houses were being readied for reoccupation. A *qarmat* site 10 km to the northeast, on the open coast, is very close to Qariaraqyuk in size and appears to have been the primary summer settlement used by the latter's occupants, hence the community's actual residential base during the whaling season.

During the summer of 1992 features, isolated artifacts, and bowhead whale bones were mapped over an area of about 30 hectares centred on the winter house row (Table 1). All specimens located in the field were recorded by anatomical element, or as unidentified whale bone. The 'distal caudal vertebra' category includes caudal vertebrae lacking transverse processes and less than about 20 cm in diameter. Only proximal mandibles were systematically sided, producing a site-wide bowhead MNI (Minimum Number of Individuals) of 261. A single phalanx and two sternabrae were eliminated from the present analysis due to small sample size. This leaves a total of 3360 elements in 16 anatomical classes, and close to 700 unique locations consisting of the coordinates of 1) features with associated bone, 2) bone clusters, and 3) isolated bones. These disparate spatial data were rationalized by dividing the site into a 5 m grid and tallying elements for each 25 m^2 grid unit.

To explore underlying spatial structure in the whale bone distribution, the matrix of counts on each of the 16 element classes for all 567 grid units with one or more whale bones was used as input for a principal components analysis. This procedure effectively produced a smaller number of new variables, or principal

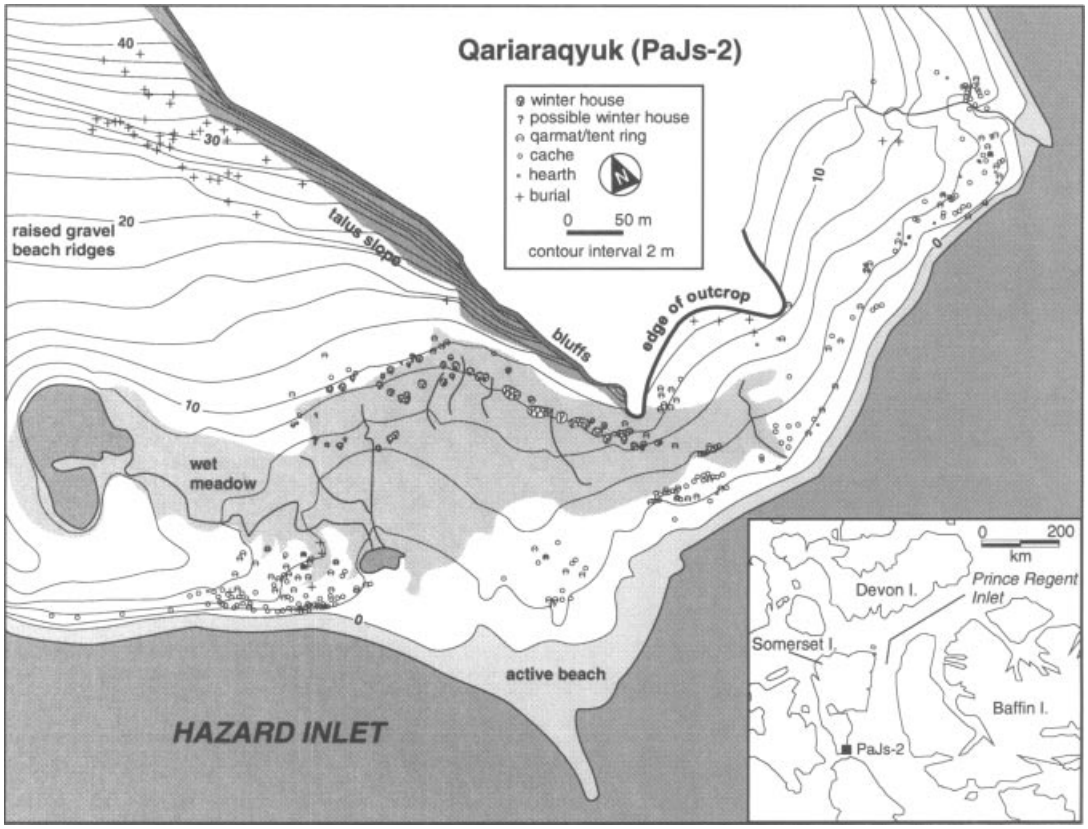

Figure 2. Map of Qariaraqyuk.

components, each of which represents a weighted combination of similarly distributed element classes (Table 2). Patterns of covariation among the element classes were thus identified, and the dataset reduced to a more manageable size. Component loadings of greater than 0.4 on a variable, in this case an element class, are taken to be particularly significant with respect to interpreting the component, and so are indicated on the bowhead skeletons accompanying the following contour maps (Figure 3). These maps depict the smoothed distribution of grid unit scores on each of the five components with eigenvalues greater than one.

The first component groups the elements that were most abundant at Qariaraqyuk, including several fragmentary bone classes (Figure 3A). Elements in this group are among the most useful in the bowhead skeleton for house construction and artifact manufacture. However, the inclusion here of the most heavily fragmented categories (distal mandible, maxilla/premaxilla, rib fragment, unidentified) indicates that many are the byproduct not only of manufacturing but (and perhaps to a greater degree) bone scavenging activities. Grid units with high scores on this component are found in the vicinity of the winter houses, both in a few of the houses with very high bone counts, and in a large cluster to the northwest of the house row. The latter cluster is identified on other grounds as a specialized bone processing area that relates to abandonment and/or post-abandonment events, hence this component can be interpreted as an index of whale bone scavenging.

The second component loads on a slightly different suite of elements, including some of the "useful" elements in the first component. However vertebrae and skull bases are also included in this group, while distal mandibles fall just below the 0.4 cutoff. High scores on the second component occur exclusively in close association with winter houses and so this element would appear to be

Table 1. Surface finds recorded during 1992 survey at Qariaraqyuk

	n
Feature	
burial	51
burial/cache	27
cache-boulder	35
cache-gravel	73
hearth	28
qarmat	8
tent ring-boulder	47
tent ring-gravel	23
winter house	57
TOTAL	349
Bowhead whale bone	
atlas	17
humerus	54
hyoid	41
mandible-distal	594
mandible-proximal	517
maxilla/premaxilla	344
phalanx	1
radius/ulna	27
rib (>50% complete)	421
rib fragment	290
scapula	113
skull base (>50% complete)	40
skull base fragment	31
sternabra	2
unidentified fragment	474
vertebra	297
vertebra-distal caudal	27
vertebral epiphysis	73
TOTAL	3363
Isolated artifact	104

a sort of signature of winter house construction (Figure 3B). In fact, the six elements grouped under this component correspond to the six most highly ranked elements in Savelle's architectural utility index (Savelle, 1997). That proximal mandibles are strongly associated with this component, but not distal mandibles, probably reflects scavenging of the latter for later house and sled construction. The component might best be considered a *residual* (post-scavenging) signature of house construction.

The third component begins to pick up the hypothesized pattern of transport of small, irregularly-shaped elements in larger butchery units (Figure 3C). It loads only on hyoids and the combined radius/ulna category. Units with high scores are scattered amongst the winter houses, and towards the eastern end of the survey area, but the major concentration occurs in a sheet midden behind the eastern part of the house row. The fourth component loads on humeri and caudal vertebrae (Figure 3D). There is an extensive scatter of high-scoring units in the eastern sheet midden, and a few very high scoring units at the western end of the house row. Interestingly, these elements are strongly associated with an area of temporary warm weather occupation southwest of the house row, and to a lesser extent in the northeast part of the survey area.

Table 2. Results of principal components analysis of whale bone distribution (567 grid units, 16 variables)

	PC 1	PC 2	PC 3	PC 4	PC 5
eigenvalue	5.83	1.50	1.27	1.04	1.01
% variance explained	36.5	9.4	8.0	6.6	6.3
cumulative % variance	36.5	45.8	53.8	60.3	66.6
variable	loading (after varimax rotation)				
atlas	0.11	0.62	0.07	−0.02	−0.03
humerus	0.08	0.28	0.02	0.54	−0.34
hyoid	0.19	0.06	0.75	0.08	0.04
mandible-distal	0.84	0.39	0.07	−0.07	−0.01
mandible-proximal	0.65	0.62	0.03	−0.16	0.00
maxilla/premaxilla	0.60	0.55	0.31	−0.29	−0.10
radius/ulna	0.08	0.07	0.76	0.13	−0.06
rib	0.52	0.54	0.39	−0.21	−0.12
rib fragment	0.71	0.07	0.16	0.21	−0.04
scapula	0.73	0.28	0.24	−0.02	0.00
skull base	0.12	0.77	−0.18	0.10	0.11
skull base fragment	0.03	0.67	0.19	0.24	0.03
unidentified fragment	0.82	−0.12	−0.01	0.20	0.01
vertebra	0.38	0.57	0.32	−0.23	−0.15
vertebra-distal caudal	0.06	−0.06	0.15	0.68	0.10
vertebral epiphysis	−0.02	0.06	−0.02	−0.01	0.93

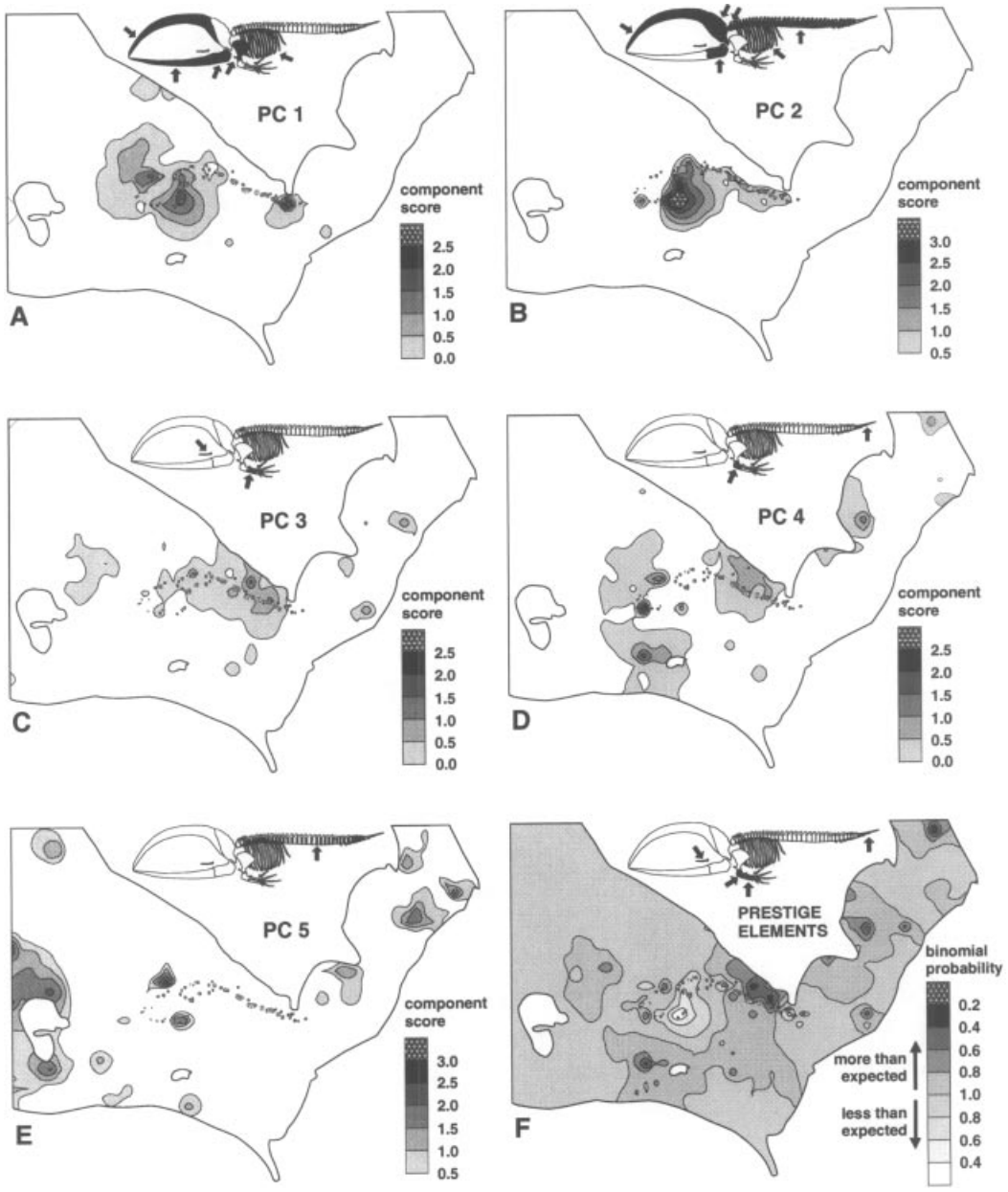

Figure 3. A-E: Smoothed grid unit scores on principal components 1–5. Elements with loadings greater than .4 on a component are indicated on the accompanying skeletal diagram. F: Smoothed binomial probability of encountering as many as the observed number of ''prestige'' bowhead elements in a given 25 m^2 grid unit. Note that numerous grid units had binomially significant ($p < .05$) surpluses of these elements, and a small number significant deficits, but the contouring procedure tended to smooth away values greater than $p = .01$.

The last component loads only on vertebral epiphyses (Figure 3E). Grid units with high scores occur at the margins of the winter house row, in or adjacent to some of the clusters of warm weather features, and at the western edge of the survey area. Since one of the few ethnographic and archaeological identifications of bowhead epiphysis use is for spinning tops, and since epiphyses appear to be distributed independently of all other element classes, it is conceivable that

this component monitors children's play activities on the periphery of the major residential loci.

Components three and four match expectations for the transport of small elements in the most highly prized butchery units. The slight differences in the distribution of humeri and caudal vertebrae, versus hyoids and radii/ulnae, may reflect the seasonal and spatial context in which particular parts were consumed and discarded. The carcass portion that contained humeri may have sometimes been processed and/or partly consumed at the end of the whaling season, in fall, when the tents and *qarmat* at Qariaraqyuk were occupied. The tail may also have been consumed frequently during the fall, and perhaps spring as well, as it was in North Alaska during the "Slush Ice" and "Whale Tail" feasts hosted by successful umialiks at these seasons. Tongues and flippers appear to have been consumed predominantly in winter, and hence discarded in the midden next to the winter house row rather than in the vicinity of warm weather dwellings.

To obtain a simpler representation of this patterning in the "prestige element" distributions, the four classes were combined, and their frequencies evaluated with binomial probabilities. This procedure determines the probability of finding as many as the observed number of specimens in a particular grid unit, given that prestige elements account for only 4.4% of the surface whale bone assemblage. The results reveal the strength of the cluster in the eastern sheet midden, and suggest that the high scores in some houses, and at the western end of the site more generally, are due to high overall bone counts, and not unusually high frequencies of these elements. Secondary clusters emerge in the vicinity of the southwestern tent ring and *qarmat* group, and in the northeastern part of the survey area, both on the strength of relatively high frequencies of caudal vertebrae and humeri.

The sheet midden occurs directly behind a cluster of house groups that includes the largest features at Qariaraqyuk. Five dwellings and a *karigi* were excavated in this and an adjacent region of the site in 1993 and 1994. The *karigi* and larger dwellings near the midden contained the most abundant direct evidence of whaling participation, in the form of whaling equipment and more of the skeletal riders associated with choice carcass portions, notably phalanges (Whitridge, 1999b). The whaling households also tended to produce higher frequencies of exotic commodities (e.g. native copper, meteoritic iron, amber) and ornaments, which is again consistent with the North Alaskan pattern: wealth and prestige were both prerequisites and consequences of whaling leadership. The settlement neighbourhood adjacent to the sheet midden appears to have been the primary residential area for the most active participants in whaling, likely analogous to North Alaskan *umialit*, as well as the most important locus of ceremonial activity, by virtue of the largest *karigi* occurring here.

Conclusions

Patterning in the surface distribution of prestige elements revealed by the principal components analysis proved to be an accurate predictor of spatial structure in community social relations and ritual, as determined by house excavations. Although the relative remoteness of Qariaraqyuk from areas of historic and modern settlement may have protected it from some of the whale bone scavenging experienced at other sites, an advantage of focusing on the skeletal riders associated with ethnographically prized carcass portions is that these elements have little or no architectural or artifactual utility, hence have probably been unattractive to later Inuit groups. Similar patterning in these element classes can thus be expected at other Thule whaling sites in the central Arctic "core area" of bowhead availability, as defined by Savelle and McCartney (1994). In peripheral regions, where bowheads were scarcer and less predictable, cooperation rather than competition may have been the rule, and the intrasite distribution of prized element classes less uneven. Over 60 years ago, Margaret Lantis (1938) speculated on the occurrence among central Arctic Thule whalers of ritual practices associated with a widespread whale cult, and despaired of the question ever being answered with certainty. The results of these analyses suggest that strong parallels can indeed be discerned between prehistoric Thule and ethnographically-observed whale use. These parallels relate not only to logistical and

ecological aspects of whale procurement and utilization, but to the social relations in which whaling was embedded, and the ritual disposition of whale products that was intimately linked to status-based roles in the whale hunt.

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