

# LOST IN THE COLLECTION: RECONSIDERING THE MEAT CACHE 35 ASSEMBLAGE AND THE QUESTION OF A THULE OCCUPATION AT KUKULIK

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## ABSTRACT

Nearly seventy-five years after excavation, the archaeological collections from the Kukulik site on St. Lawrence Island, Alaska, were recently the focus of an extensive rehousing and stabilization project funded by the National Park Service's Save America's Treasures program. During the course of that project, a series of uncataloged artifacts were re-identified from a small assemblage originally excavated in 1935 from an isolated storage feature. This assemblage figured prominently in the original site analysis (Geist and Rainey 1936) but was, until the current relocation, thought to have been lost. The original analysis presented the possibility that Meat Cache 35 represented a Thule occupation at Kukulik. This had implications regarding the prehistory of the Bering Sea region beyond St. Lawrence Island, because before this, evidence of the Thule culture was primarily restricted to the Eastern Arctic and the mainland of Alaska. This paper will discuss the cultural and temporal relationship of the so-called "Thule Meat Cache" assemblage to the site of Kukulik through a combination of stylistic typology, radiocarbon data, and spatial information. Through this reanalysis, the cultural and temporal interpretations of the site are brought back into question, especially those concerning a Thule presence at Kukulik.

**KEYWORDS:** St. Lawrence Island, Punuk, Bering Strait prehistory

## INTRODUCTION

From 1931 through 1935 Otto Geist carried out excavations at the site of Kukulik on St. Lawrence Island, Alaska (Fig. 1). During the 1935 season a small storage feature, Meat Cache 35 (MC 35), was excavated that attracted some attention. The "Thule Meat Cache," as it was described, contained materials originally determined to represent a "pure Thule" occupation at the site of Kukulik (Geist and Rainey 1936:198). This conclusion was based both on the stratigraphic location of the feature and through comparison of the artifacts to others at the site and abroad. The possibility that Thule people had actually maintained a presence on St. Lawrence Island was contrary to the then-current interpretations. At the time

of the Kukulik excavations, a Thule culture was only recently defined in the Eastern Arctic by Mathiassen (1927). Yet the assemblage of artifacts found in association with the feature suggested both to Geist and to Rainey, who analyzed the collections, that the meat cache represented an early Thule occupation at Kukulik.

At the time of excavation in 1930, Kukulik was an abandoned Siberian Yupik village comprised of two prominent mounds that were essentially anthropogenic middens, the result of an estimated 2,000 years of human habitation. This deposit presented an unrivaled potential to trace the sequence of development of Eskimo culture at a single site (Geist and Rainey 1936).

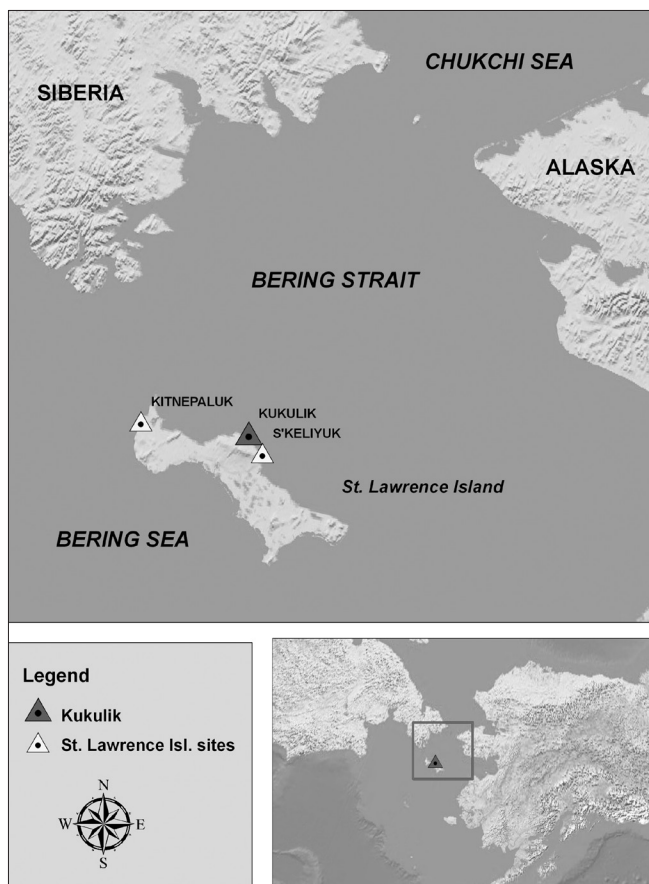


Figure 1. Map of St. Lawrence Island and the Bering Strait region.

As Collins (1939:481) observed, “[a]t Kukulik the remains of all [Eskimo] periods are found in stratigraphic sequence in a single huge midden.” The first formal excavations at Kukulik were carried out by Geist between 1931 and 1933 as a test trench that bisected the larger of the two mounds, the “single huge midden” referred to by Rainey (1936). The results of this work were used as the foundation for seeking support to conduct a more expansive project in 1934–1935 by the Department of the Interior-Alaska College Expeditions (DOI-ACE) (Geist and Rainey 1936). Subsequent excavations at Kukulik focused on the easternmost of the two mounds, often referred to as the Main Midden (Fig. 2). This large mound was an average of 5 m high, roughly L-shaped, and measured 194 m long by 41 m wide at its base.<sup>1</sup>

Excavation revealed that the mound contained a stratified matrix of alternating layers of habitation refuse and noncultural plant material and sedimentary matrix (Geist and Rainey 1936).

Numerous habitation-related features, including the remains of semisubterranean house pits, meat caches and various other storage structures, were unearthed during the excavations at Kukulik. During the 1934 and 1935 seasons the majority of the Main Midden northeast of the test trench was removed to 92 to 107 cm below the original surface (Geist and Rainey 1936:85). Geist and Rainey (1936) only briefly describe their excavation methods and no specific provenience data were ever published, despite the elaborate data-recording techniques in place.<sup>2</sup> Several stratigraphic details were mentioned, including, most prominently, a series of “compressed sods” that were encountered during excavation and noted in the test trench profile (Geist and Rainey 1936:40). A second vertical cut or trench excavated lengthwise across the northeastern beach slope of the mound during 1935 produced a similar stratigraphy (Geist and Rainey 1936:200). The sod “lines,” or layers, were assumed to be evidence for periods of site abandonment, potentially useful in delineating the cultural horizons within the deposit (Geist and Rainey 1936:45).

One distinctive sod line was encountered across the entire site throughout the 1935 season. This feature was described by Geist (in Geist and Rainey 1936:57) as occurring “at an average depth of 36 inches [91.4 cm] from the original surface” and representing “the lower limit of the deposit laid by the last inhabitants.” The artifacts discovered in excavations through this layer were typically identified as the Thule type. Importantly, the Meat Cache 35 feature was also discovered below this layer and contained similar specimens. According to Rainey (1936:198), “the objects found in Meat Cache 35 include harpoon heads...and associated artifacts...like those described by Mathiassen (1927) as Thule types,” which suggested that a “pure Thule” phase at Kukulik preceded an altered “Alaska Thule” phase. Should this be the case, Meat Cache 35 would have critical implications for the prehistory of the Bering Sea region beyond St. Lawrence Island, because

1. The original measurements recorded during excavation were in feet. For this paper all such measurements are converted to the approximate metric value.
2. During the 1934 and 1935 seasons the section of the Main Midden east of the test cut was divided into sections, each of which was excavated gradually as thawing permitted, by working from the seaward side up the slope of the mound, across the surface, and back down the landward side. As features were uncovered the location and depth measurements of the corners and the floor were measured through use of engineering survey techniques and tools including a Lietz transit.

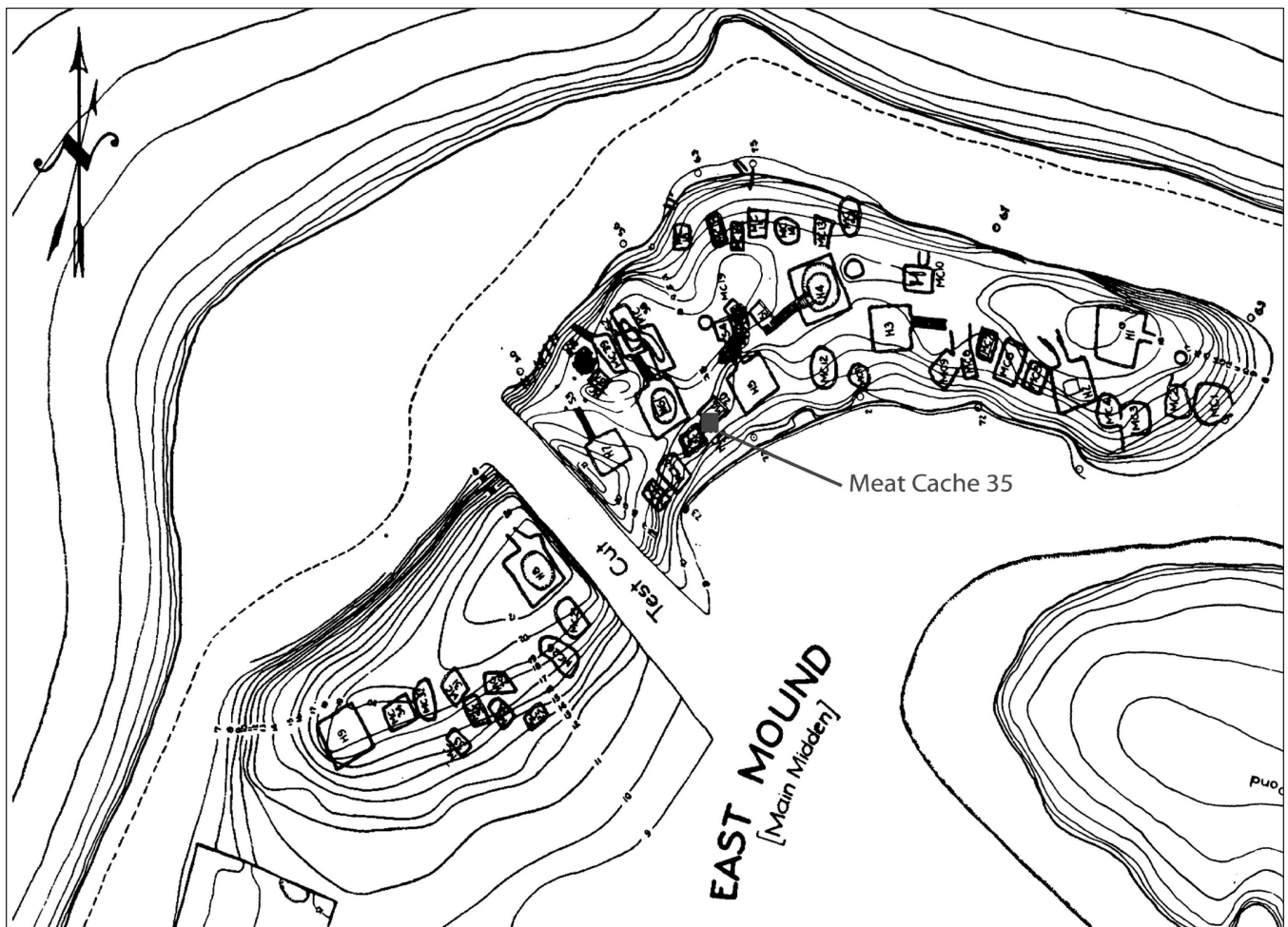


Figure 2. Site map of Kukulik showing location of Meat Cache 35 (Geist and Rainey 1936:54).

before this, evidence of the Thule culture was primarily restricted to the Eastern Arctic and the Alaska mainland.

An extensive rehousing and stabilization project focused on the archaeological collections from Kukulik<sup>3</sup> was recently completed at the University of Alaska Museum of the North (UAMN). The result of this project was the stabilization, through reorganization and rehousing, of the 1934 and 1935 DOI-ACE materials to current, best-practice curatorial standards. In 2008, as a direct result of these efforts, numerous uncataloged artifacts were located that had been separated from the majority of the 1934–1935 collection. Many of the artifacts were determined to be those originally excavated from MC 35, with a number of other MC objects located over the next several months. The relocation of these artifacts prompted this reinvestigation of some of the original interpretations of Kukulik, specifically the possibility of a Thule occupation.

### THULE AT KUKULIK? RECONSIDERING MEAT CACHE 35

Following the publication of the Kukulik report (Geist and Rainey 1936), some controversy surrounded the claim that the Thule culture was found at Kukulik. In reviewing the report, de Laguna (1939:291) noted that “Rainey’s ‘Thule’ stage is a complete misnomer” and instead interpreted MC 35 as “Late Punuk.” In another review, Collins (1939:480) claims that “there cannot be both Thule and a Punuk phase, separated in time, since in this particular locale the two were practically equivalent,” further proposing that “the Punuk stage on St. Lawrence, being contemporaneous with the Thule at Bering Strait and, approximately, with Mathiassen’s [1927] central Canadian Thule, has much in common with both, despite its numerous local peculiarities” (Collins 1939:480). One of

3. Official grant title: Preserving the 1934–35 Department of the Interior: Alaska College Expedition Archaeological Collection at the University of Alaska Museum under IMLS Grant ST-00-05-0005-05.

the aims of this paper is to review the analysis of the MC 35 collection and through comparisons with more recent literature, gain new insight into these long-standing conflicts of interpretation.

### THE MEAT CACHE 35 ASSEMBLAGE

The meat cache features at Kukulik are not uniform in either construction or use, as described by Geist and Rainey (1936:66), although the structures are generally smaller than the house features. Structurally, the caches are excavated pits lined with walls of stone and wood, often with wooden roofs supported by whale jawbones and covered with dirt and sod (Geist and Rainey 1936:66). Including MC 35, ten cache structures were described briefly, mostly in relation to their construction, without artifact inventories (Geist and Rainey 1936:66–72). Five of the structures were comparatively recent, analyzed in association with the Modern House (Rainey in Geist and Rainey 1936: 87–134). Unfortunately, this analysis was not feature-based; instead, all six assemblages are described as a single collection.

Due to the perceived historical importance of the MC 35 feature, Geist and Rainey presented its analysis in a distinct section, with each artifact described and compared to other assemblages (Geist and Rainey 1936:191–198). The MC 35 feature is described as “a floor made of poles, covered by five or six layers of walrus hide” (Geist and Rainey 1936:191–192). MC 35 “lay...approximately 5 feet [1.52 m] below the surface under meat caches 20 and 21,” and this stratigraphic position meant that it was “entirely unrelated to recent-prehistoric meat caches” (Geist and Rainey 1936:191, 198).

While most of the artifacts excavated from MC 35 were described and even photographed for the report (Geist and Rainey 1936:191–198, 307–310) the objects were never cataloged, and until their recent rediscovery were considered lost. Not until the fortuitous discovery of the first uncataloged specimens was a concerted effort undertaken to relocate the entire MC 35 assemblage. As it happened, MC 35 artifacts were scattered throughout UAMN collections. Some had remained uncataloged for several generations, set aside as quandaries to be addressed at a future time. Others, at some point, were mislabeled and were consequently stored with unrelated or “miscellaneous” collections. As items were located, each was meticulously compared to the written descriptions and to photographs from the report. Fortunately, the original

manuscript for the report, complete with photo plates, is archived in the Geist collection in the Alaska and Polar Regions Department at Rasmuson Library, UAF. As shown in Table 1, compiled from the original descriptions (Geist and Rainey 1936:191–198), the MC 35 assemblage contains a total of seventy-two items. To date, all but nineteen of the MC 35 artifacts have been relocated.

For this reanalysis, I adapted the system of classification of Nelson (1983 [1899]) used to describe the ethnographic artifacts collected during fieldwork in the Bering Strait region. Following this system, the artifacts from MC 35 can be divided into eight functional categories: Hunting, Fishing, Travel/Transportation, Utensils/Implements ‘Domestic,’ Tools/Utensils ‘Arts and Manufacture,’ Personal Adornment, Entertainment, and Miscellaneous. Following this system, the MC 35 assemblage contains mostly two implement types (Fig. 3.1), foremost, arts and manufacture ( $n = 25$ ), followed by domestic ( $n = 14$ ). The next most frequent types relate to hunting ( $n = 18$ ). Least represented are the personal adornment and entertainment categories ( $n = 5$  combined), while the miscellaneous category is not represented at all. Sixty-eight percent of the assemblage is ivory or wood, while nonorganic materials include stone ( $n = 20$ ; 28%) and ceramics ( $n = 3$ ; 4%) (Fig. 3.2).

For the sake of comparison, the other meat cache features at Kukulik were similarly analyzed for related artifacts ( $n = 3,845$ ) (Figs. 4.1 and 4.2). The features contained in this analysis of the 1934 collection were excavated from the uppermost levels of the deposit, considered to represent the more recent occupations. Significantly, the percentages of functional categories were similar to that of MC 35, with the majority ( $n = 1,787$ ; 47%) represented by the two implement categories. However, in the “modern” case, contrary to the MC 35 results, the domestic category outnumbered the arts and manufacture. Comparable to the MC 35 assemblage these categories were followed by hunting paraphernalia ( $n = 431$ ; 11%). Similarly the composition of materials is represented primarily by ivory and wood ( $n = 1,714$ ; 61%). In contrast, besides stone and ceramic, the nonorganic materials include metal (mostly iron and copper) and glass, neither of which was found in the MC 35 assemblage. Like Rainey’s (in Geist and Rainey 1936) original effort, this present analysis is a preliminary effort combining the various features. A more thorough analysis would treat each feature as a distinct assemblage, an effort beyond the scope of the current project. Suffice to say, these comparative efforts suggest that, while a certain



*Table 1. The Meat Cache 35 artifacts.*

Catalog Number	Artifact Common Name	Material	Found?	Image #	Page #	Category Code
3-1935-0001	Harpoon head	Ivory	Y	Pl.63-c1	192	Hunting
3-1935-0002	Harpoon head	Ivory	Y	Pl.63-c2	192	Hunting
3-1935-0003	Harpoon head	Antler	Y	Pl.63-8a	192	Hunting
3-1935-0004	Harpoon head	Antler	Y	Pl.63-8b	192	Hunting
3-1935-0005	Harpoon head	Antler	Y	Pl.63-1	192	Hunting
3-1935-0006	Harpoon head (unfinished)	Ivory	Y	Pl.63-2	192	Hunting
3-1935-0007	Harpoon foreshaft receiver	Ivory	Y	Pl.63-3	192	Hunting
3-1935-0008	Tool handle	Antler	Y	Pl.63-4	192	Tool/Implements (Arts and Manufacture)
3-1935-0009	Tool sharpener	Walrus tooth	Y	Pl.63-5	192	Tool/Implements (Arts and Manufacture)
3-1935-0010	Awl?	Ivory	Y	Pl.63-6	193	Tool/Implements (Arts and Manufacture)
3-1935-0011	Wedge	Ivory	Y	Pl.63-7	193	Tool/Implements (Arts and Manufacture)
3-1935-0012	Wedge	Ivory	N	na	193	Tool/Implements (Arts and Manufacture)
3-1935-0013	Wedge	Ivory	N	na	193	Tool/Implements (Arts and Manufacture)
3-1935-0014	Wedge	Ivory	N	na	193	Tool/Implements (Arts and Manufacture)
3-1935-0015	Wedge	Ivory	N	na	193	Tool/Implements (Arts and Manufacture)
3-1935-0016	Blubber scraper	Ivory	Y	Pl.63-8	193	Utensils/Implements (Domestic)
3-1935-0017	Adze head	Ivory	N	Pl.63-9	193	Tool/Implements (Arts and Manufacture)
3-1935-0018	Armor slat	Bone	Y	Pl.63-10	193	Personal Adornment
3-1935-0019	Armor slat	Bone	Y	Pl.63-11	193	Personal Adornment
3-1935-0020	Armor slat	Bone	Y	na	193	Personal Adornment
3-1935-0021	Snow beater	Bone	Y	Pl.63-12	193	Utensils/Implements (Domestic)
3-1935-0022	Lamp trimmer or meat fork	Bone	N	Pl.63-13	193	Utensils/Implements (Domestic)
3-1935-0023	Boat or blubber hook	Ivory	Y	Pl.64-1	194	Travel
3-1935-0024	Fish line sinker	Bone	Y	Pl.64-2	194	Fishing
3-1935-0025	Fish line sinker	Ivory	Y	Pl.64-3	194	Fishing
3-1935-0026	Fish line sinker	Ivory	Y	Pl.64-5	194	Fishing
3-1935-0027	Net sinker	Ivory	Y	Pl.64-6	194	Fishing
3-1935-0028	Net sinker?	Ivory	Y	Pl.64-4	194	Fishing
3-1935-0029	Sled runner	Ivory	Y	Pl.64-7	194	Travel
3-1935-0030	Sled runner	Ivory	Y	Pl.64-8	194	Travel
3-1935-0031	Sod hoe	Bone	Y	Pl.64-9	194	Utensils/Implements (Domestic)
3-1935-0032	Notched barb	Wood	Y	Pl.36-1	195	Tool/Implements (Arts and Manufacture)
3-1935-0033	Notched barb	Wood	Y	Pl.36-2	195	Tool/Implements (Arts and Manufacture)
3-1935-0034	Drag line handle	Wood	Y	Pl.36-3	195	Hunting
3-1935-0035	Toy lance shaft	Wood	N	Pl.36-4	195	Entertainment
3-1935-0036	Toy bow	Wood	Y	Pl.36-5	195	Entertainment
3-1935-0037	Arrow	Wood	N	Pl.36-6	195	Hunting

*Table 1 (continued)*

Catalog Number	Artifact Common Name	Material	Found?	Image #	Page #	Category Code
3-1935-0038	Arrow	Wood	Y	Pl.36-7	195	Hunting
3-1935-0039	Foreshaft insert	Bone	Y	Pl.36-7	195	Hunting
3-1935-0040	Bow	Wood	Y	Pl.36-9	196	Hunting
3-1935-0041	Bucket handle	Wood	Y	Pl.36-8	195	Utensils/Implements (Domestic)
3-1935-0042	Drying rack frame piece	Wood	Y	Pl.36-12	196	Utensils/Implements (Domestic)
3-1935-0043	Drying rack frame piece	Wood	Y	Pl.36-13	196	Utensils/Implements (Domestic)
3-1935-0044	Boat frame piece	Wood	Y	Pl.36-11	196	Travel
3-1935-0045	Bow	Wood	Y	Pl.36-10	196	Hunting
3-1935-0046	Harpoon rest?	Wood	Y	Pl.36-14	195	Hunting
3-1935-0047	Ulu blade	Slate	N	na	196	Utensils/Implements (Domestic)
3-1935-0048	Ulu blade	Slate	Y	Pl.66-1	196	Utensils/Implements (Domestic)
3-1935-0049	Point base	Slate	Y	Pl.66-2	196	Hunting
3-1935-0050	Point	Slate	Y	Pl.66-3	196	Hunting
3-1935-0051	Point	Slate	N	na	196	Hunting
3-1935-0052	Blade?	Slate	Y	Pl.66-4	196	Tool/Implements (Arts and Manufacture)
3-1935-0053	Blade?	Slate	N	na	196	Tool/Implements (Arts and Manufacture)
3-1935-0054	Blade?	Slate	N	na	196	Tool/Implements (Arts and Manufacture)
3-1935-0055	Scraper or blade blank	Slate	Y	Pl.66-6	196	Tool/Implements (Arts and Manufacture)
3-1935-0056	Scraper or blade blank	Slate	Y	Pl.66-7	196	Tool/Implements (Arts and Manufacture)
3-1935-0057	Scraper or blade blank	Slate	N	na	196	Tool/Implements (Arts and Manufacture)
3-1935-0058	Scraper or blade blank	Slate	N	na	196	Tool/Implements (Arts and Manufacture)
3-1935-0059	Scraper or blade blank	Slate	N	na	196	Tool/Implements (Arts and Manufacture)
3-1935-0060	Blade?	Slate	Y	Pl.66-5	196	Tool/Implements (Arts and Manufacture)
3-1935-0061	Adze blade	Basalt	Y	Pl.66-8	196	Tool/Implements (Arts and Manufacture)
3-1935-0062	Adze blade	Basalt	Y	Pl.66-10	197	Tool/Implements (Arts and Manufacture)
3-1935-0063	Point?	Basalt	Y	Pl.66-9	197	Hunting
3-1935-0064	Rubbing or hammerstone	Stone	Y	Pl.66-11	197	Tool/Implements (Arts and Manufacture)
3-1935-0065	Rubbing or hammerstone	Stone	Y	Pl.66-12	197	Tool/Implements (Arts and Manufacture)
3-1935-0066	Whetstone?	Basalt	Y	Pl.66-13	197	Tool/Implements (Arts and Manufacture)
3-1935-0067	Potsherd	Ceramic	N	Pl.66-14	197	Utensils/Implements (Domestic)
3-1935-0068	Potsherd	Ceramic	N	Pl.66-15	197	Utensils/Implements (Domestic)
3-1935-0069	Potsherd	Ceramic	N	Pl.66-16	197	Utensils/Implements (Domestic)
3-1935-0070	Bucket handle?	Baleen	Y	Pl.66-18	197	Utensils/Implements (Domestic)
3-1935-0071	Toboggan cross piece?	Baleen	N	Pl.66-17	197	Travel
3-1935-0072	Knotted line fragment	Walrus hide	Y	Pl.66-19	197	Utensils/Implements (Domestic)

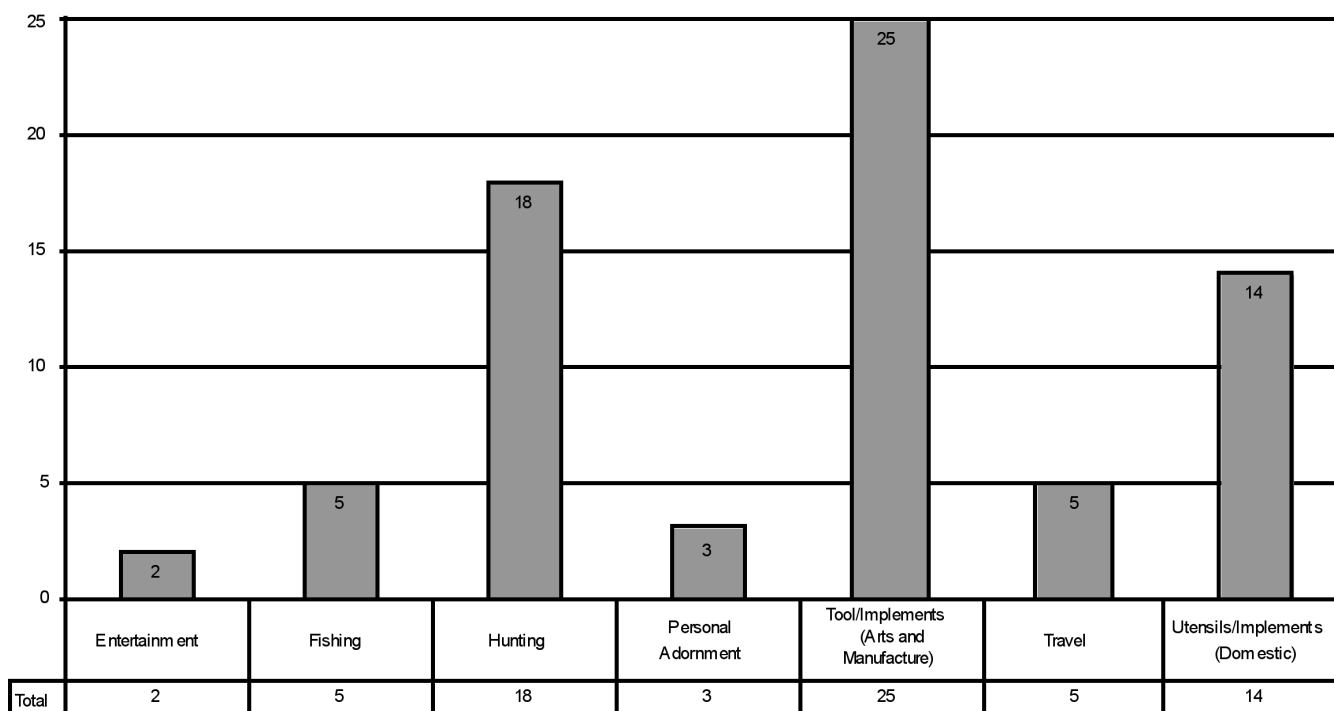


Figure 3.1. Meat Cache 35 artifacts classified by functional category.

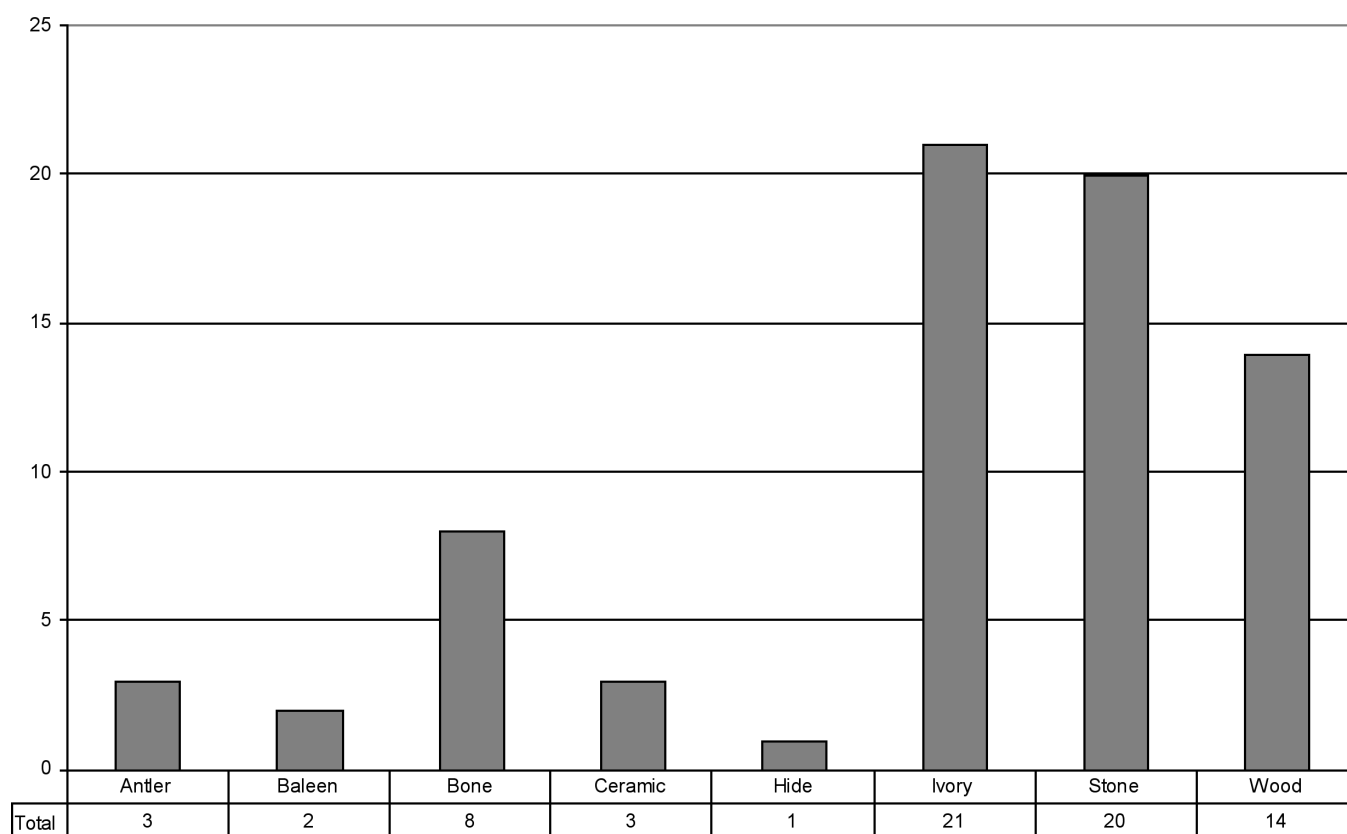


Figure 3.2. Meat Cache 35 artifacts classified by material type.

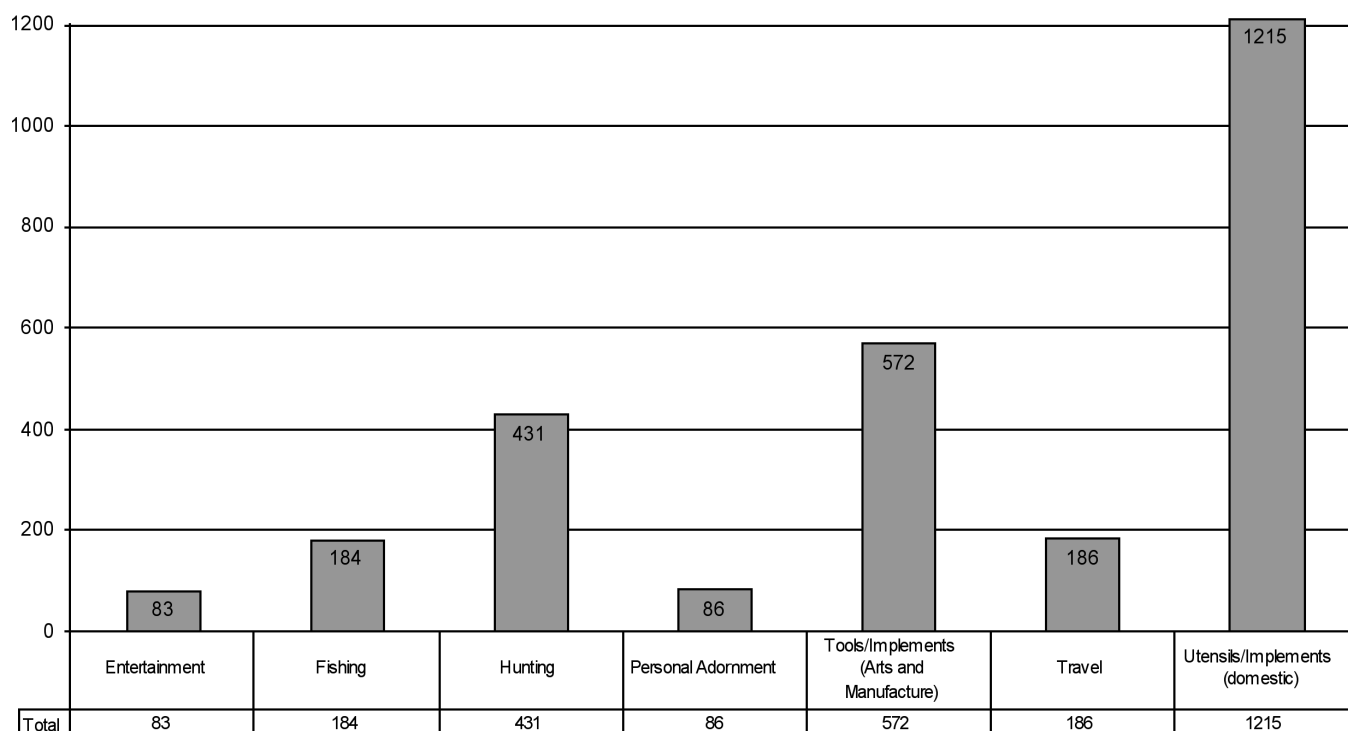


Figure 4.1. Kukulik meat cache artifacts classified by functional category.

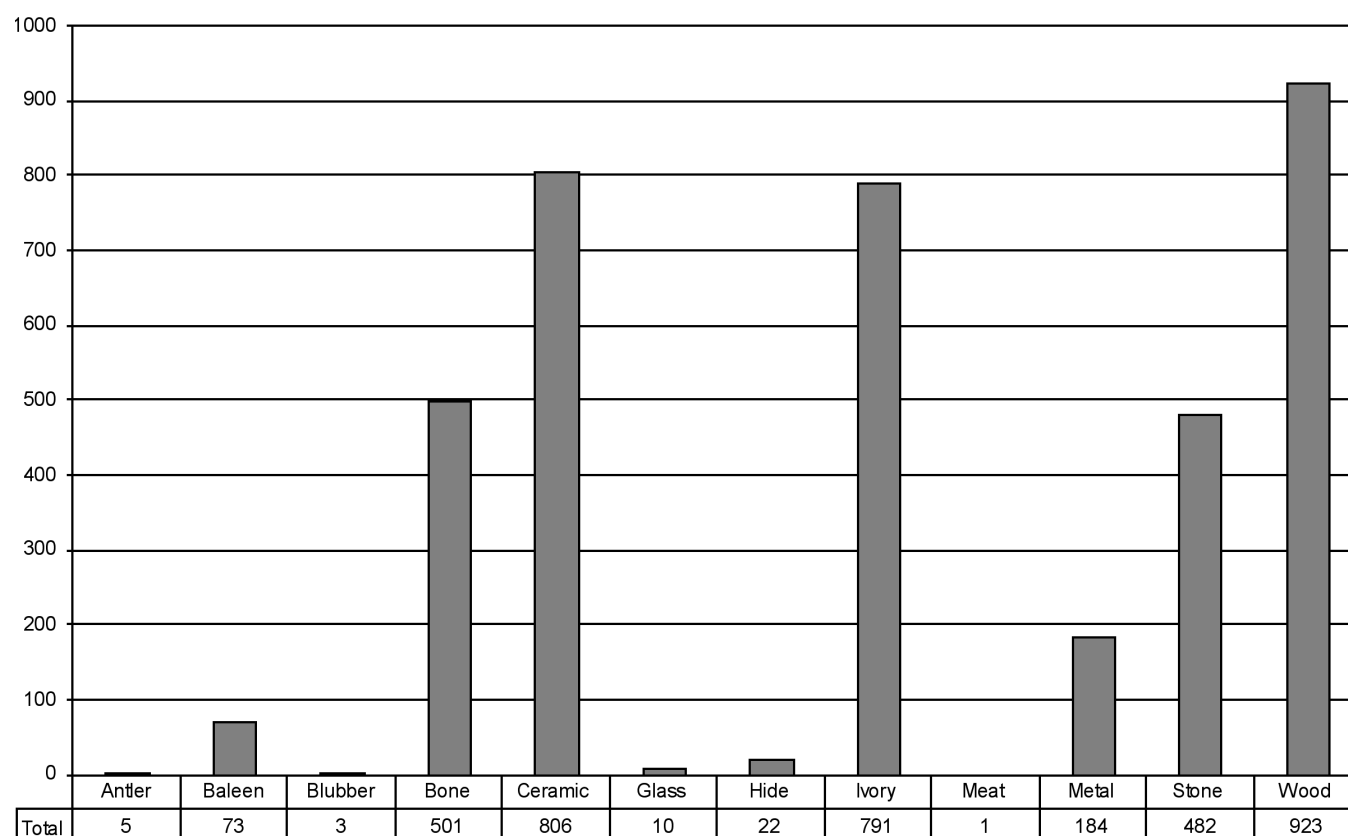


Figure 4.2. Kukulik meat cache artifacts classified by material type.



similarity occurs in the categories of artifacts, suggesting similar use patterns through time, it may be significant that domestic implements were more prevalent in the analysis of the 1934 collection, possibly suggesting gendered activities or a modern sedentary occupation. The variation in material types (glass, metal, etc.) in the 1934 collection is attributed to a nineteenth-century occupation, providing evidence for Euro-American trade.

The comparison of MC 35 to other assemblages outside the island was difficult, because it is rare that such meat cache features are discussed, given the long-standing analytical preference to excavate house structures by most Thule archaeologists. In addition, in terms of the general composition of artifacts represented in the MC 35 assemblage, the “types” are largely ubiquitous forms found in most Neo-Eskimo assemblages, including sledge runners, fishing line sinkers, and various hunting implements (Figs. 5.1 and 5.2). A single adze head (Fig. 5.1a, artifact 9) in the assemblage follows the “boot shaped” form found primarily on St. Lawrence Island, defined by Collins (1937a) as a unique Punuk type. Geist and Rainey (1936:196) note that one of the two wooden bow fragments (Fig. 5.2a, artifact 10) matched a style described by Stefansson from

Victoria Island in the Western Canadian Arctic, with a well-defined “V shaped” notch on one end, signifying that it was part of a composite reflex bow. Similar types have also been described by Collins (1939) and Ford (1959). An object described as a boat or blubber hook (Fig. 5.1b, artifact 1) is similar to objects described by Ford (1959:185) from the Nuwuk and Utqiagvik sites.

The most diagnostic elements in the MC 35 assemblage are harpoon heads, an artifact type that has held particular prominence in the analysis of arctic maritime assemblages (e.g., Collins 1937a; Ford 1959; Geist and Rainey 1936; Lewis 1995; Mathiassen 1927). The particular characteristics of construction and decorative motifs (and often specific combinations thereof) frequently found on harpoon heads have led to their use as diagnostic types or “index fossils.” Thus, researchers have turned to harpoon heads in attempts to assign an assemblage to one culture or another or to establish the cultural chronology of a site (Collins 1937a; Ford 1959; Geist and Rainey 1936; Yama’ura 1984). Arguments against this practice suggest that not only is a single artifact a poor representation of a complete assemblage but that the same type or form of artifact may be used and/or curated across both time and space, thus blurring

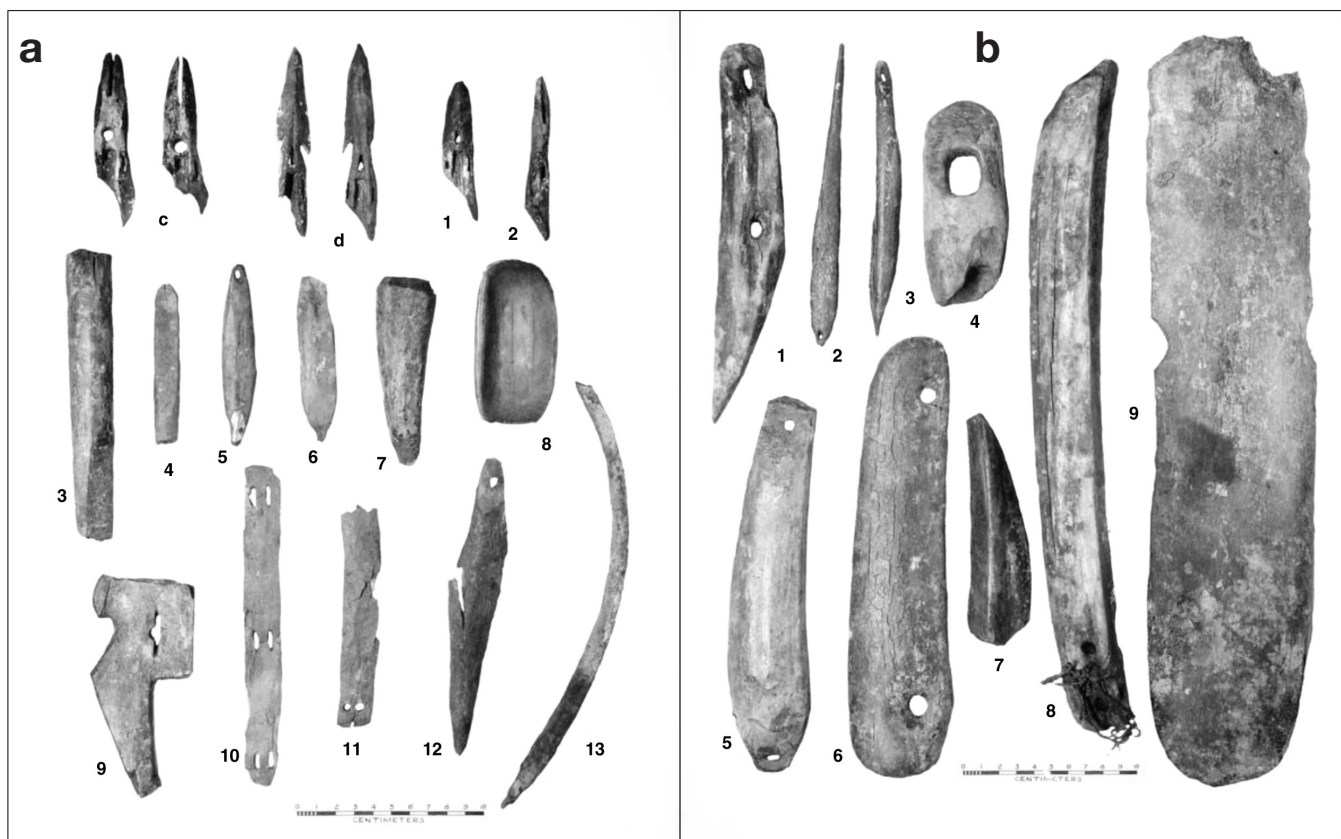


Figure 5.1. Selected artifacts from MC 35 as originally presented (Geist and Rainey 1936:Pl. 63-64).

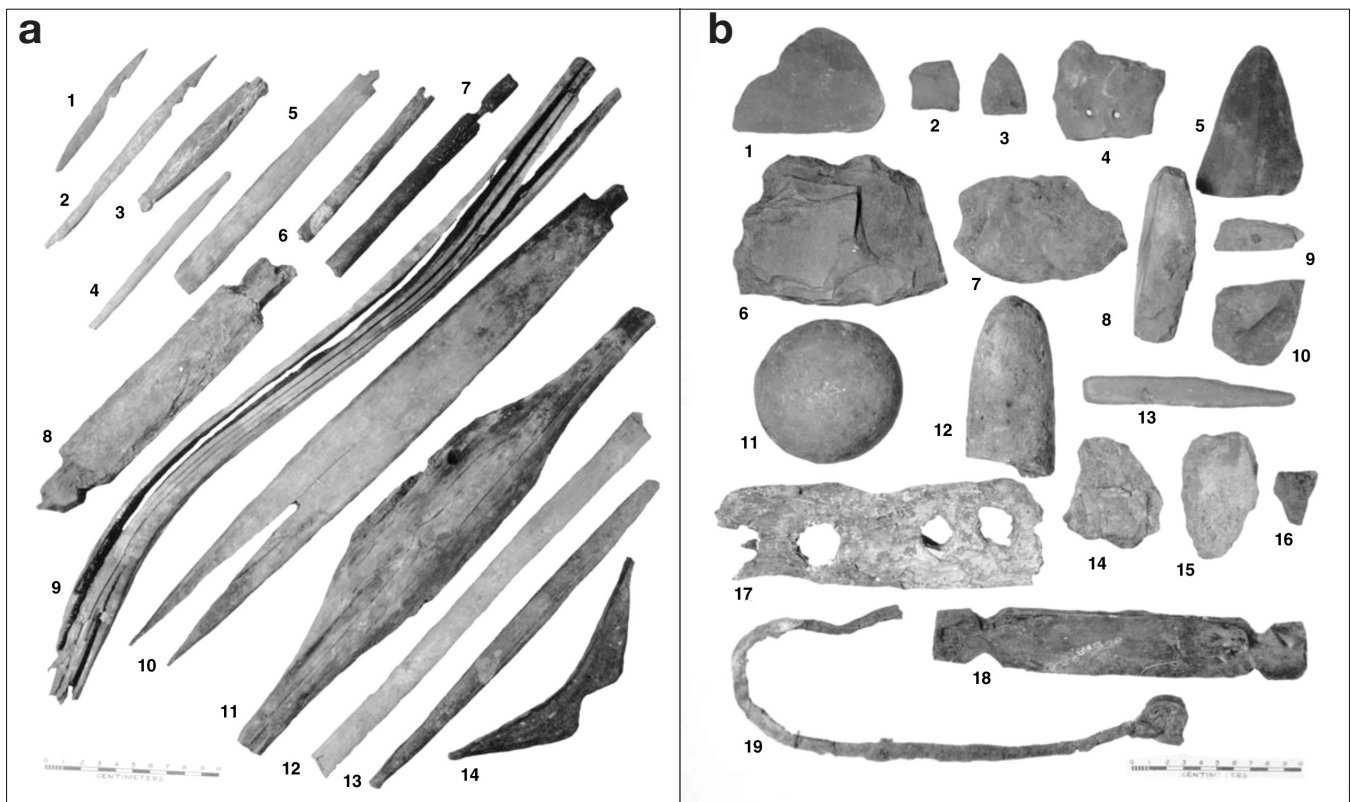


Figure 5.2. Selected artifacts from MC 35 as originally presented (Geist and Rainey 1936:Pl. 65-66).

the lines otherwise used for cultural chronology (Gerlach and Mason 1992; Lewis 1995; Murray et al. 2003; Potter 2008). Despite this, the stratigraphic analysis conducted by Rainey (in Geist and Rainey 1936) focused on harpoon heads; thus, analysis of the six harpoon heads from the MC 35 assemblage (Fig. 5.1) forms the remainder of the typological comparative analyses below.

The harpoon heads in the MC 35 assemblage are all in comparatively poor condition (Fig. 5.1). Of the six, two (Fig. 5.1a, pair c) resemble Thule 3 (Collins III(a)x, or “Sicco”) despite the lack of the characteristic line decoration. Two others (Fig. 5.1a, pair d) are typical Thule type 2 in form: self-bladed with lateral barbs, a triangular line, single spur, and two lashing slots astride an open socket. A fifth specimen (Fig. 5.1a, artifact 1) was described by Geist and Rainey (1936:192) as a Thule type 1 variant and also resembles Collins’ type V. It is self-bladed with a single spur, triangular line hole, open socket, and two slots rather than grooves for lashing. The final specimen (Fig. 5.1a, artifact 2) is unfinished and a type classification is debatable. It has a small, triangular line hole parallel to the incomplete blade slit and what appears to be the beginnings of a closed socket. Based solely on the harpoon heads de-

scribed here, it is understandable why a Thule assignment was made for the cultural affiliation of the assemblage, because both the Thule 2 and 3 styles were definitive types in Mathiasen’s (1927) original Thule definition. However, both types are also found in Collins’ (1937a) definition of Punuk on St. Lawrence Island.

#### BEYOND TYPOLOGY

Clearly, comparative analyses are limited with a small assemblage of artifacts from a single, isolated feature. Indeed, this restriction was also addressed in the original interpretation by Geist and Rainey (1936:198). Yet the occurrence of the Thule type of harpoon head initially led Geist and Rainey (1936:198) to propose that this assemblage, as noted above, represented a “pure Thule” phase at Kukulik. Based on the Thule type 2 and 3 harpoon heads, this assessment may continue to be acceptable to many researchers, considering that the Sicco types are commonly found in both “early” and “developed” or “Western” Thule contexts across the Arctic (Ackerman 1984; Dumond 1977; Giddings and Anderson 1986; Mason and Bowers 2009; Schledermann and McCullough 1980). Conversely, fol-

lowing Collins (1939) and deLaguna (1939), the assemblage could be assigned to the Late Punuk, as much of the Kukulik collection exhibits Punuk characteristics.

In order to establish chronological control on the cultural context of artifact MC 35, two samples from wooden artifacts<sup>1</sup> were sent to Beta Analytic for AMS dating (Table 2) to assess the likely age of the assemblage as a whole and therefore the feature itself. The first sample, from a wooden bow fragment (3-1935-0040),<sup>2</sup> Fig. 6, A) dated to 290±40 BP (cal AD 1483–1665, 1784–1795, Beta-248284). The second, from a worked wood fragment (3-1935-0043, Fig. 6, B) described as a “drying rack frame piece” (Geist and Rainey 1936:196) dated to 560±40 BP (cal. AD 1301–1367, 1382–1434, Beta-248285). Two additional samples from harpoon heads were submitted to serve as a test of the “index fossil” assignments associated with the assemblage. The first of these two samples, from one of the two caribou antler Thule type 2 (Collins Punuk type IV) harpoon heads (3-1935-0003, Fig. 6, C), dated to 580±40 BP

(cal. AD 1297–1373, 1377–1422, Beta-248282). The final sample (also caribou antler), taken from the Thule type 1 (similar to Collins type V) harpoon head (3-1935-0005, Fig. 6, D) dated to 660±40 BP (cal. AD 1274–1330, 1339–1397, Beta-248283).

Three of the four ages indicate that MC 35 was employed in the late thirteenth to fourteenth century AD, with the age on the bow fragment possibly an outlier—although its maximum age could fall within the late fifteenth century AD. The correspondence between the two antler and at least one of the wood ages is reassuring and the wood does not date older than the antler.

Unfortunately for resolving questions of culture history, the four calibrated dates do not support the view that MC 35 represents an early Thule feature, because the assays are apparently two to three hundred years too young for this attribution (Ackerman 1961; Blumer 2002; Dumond 1977; Mason and Bowers 2009; Morrison 1991; Stanford 1976). Certainly some of the types could fit into

*Table 2: Radiocarbon dates from Kukulik.*

UAMN Catalog Number	Beta Analytic Sample #	Artifact Description	Material	Depth Below Surface	Provenience	Measured <sup>14</sup> C Age BP	<sup>13</sup> C/ <sup>12</sup> C Ratio	Converted Age	Calibration Used	Calibrated Calendar Yr BC/AD (2 sigma)
1-1933-8692	196352	Harpoon Head	Bone	11 ft. 7 in. 3.53 m	Test cut	1920±40	-21.1	1980±40	IntCal 04	87–78 BC, 55 BC–AD 91, AD 99–124
1-1935-0115	144990	Harpoon Head	Ivory	72 in 1.83 m	Beach slope	1500±40	-13.6	1680±40	Marine 04 ΔR737±20	1323–1468
1-1935-8676	144991	Harpoon Head	Ivory	23 in. 58.4 cm	East end	1050±40	-20.8	1110±40	IntCal 04	783–787, 817–843, 860–1018
1-1935-8992	144992	Harpoon Head	Ivory	?	Test cut?	1850±40	-9.5	2110±40	Marine 04 ΔR737±20	919–1152
3-1935-0003	248282	Harpoon Head	Antler	60 in 1.52 m	MC 35	470±40	-18.2	580±40	IntCal 04	1297–1373, 1377–1422
3-1935-0005	248283	Harpoon Head	Antler	60 in 1.52 m	MC 35	550±40	-18.2	660±40	IntCal 04	1274–1330, 1339–1397
3-1935-0040	248284	Bow Fragment	Wood	60 in 1.52 m	MC 35	250±40	-22.8	290±40	IntCal 04	1483–1665, 1784–1795
3-1935-0043	248285	Drying rack piece?	Wood	60 in 1.52 m	MC 35	560±40	-24.8	560±40	IntCal 04	1301–1367, 1382–1434

1. The problems with dating archaeological materials in the Arctic are extensively addressed elsewhere (e.g., Arundale 1981; Blumer 2002; Dumond and Griffin 2002; Gerlach and Mason 1992; Lewis 1995; McGhee 2000). While some archaeologists prefer caribou antler (cf. McGhee 2000), even that material is not without ambiguities. Short-lived plant species (e.g., grasses or willow) served as reliable material to Arundale (1981). Wood, in most cases driftwood, can be plagued by whole tree effects, but its residence time in the ocean is within the range of most <sup>14</sup>C ages. In addressing the marine reservoir effect, one of the complications in dating arctic materials, Dumond and Griffin (2002) have discussed the possible range in variation between marine and terrestrial samples from sites near Gambell, approximately 64 km west of Kukulik. They suggest using the Intcal Marine 04 calibration (Hughen et al. 2004) and adding a ΔR value of 735±20 to adjust for local variation (Dumond and Griffin 2002:84). For terrestrial samples the Intcal 04 calibration curve (Reimer et al. 2004) was used. All calibrations listed were performed using the Calib 5.0 calibration program (Stuiver et al. 2006).
2. This numbering scheme relates to the early University of Alaska Museum accession records; thus this particular specimen is catalog number -0040 in the third accession record from 1935.

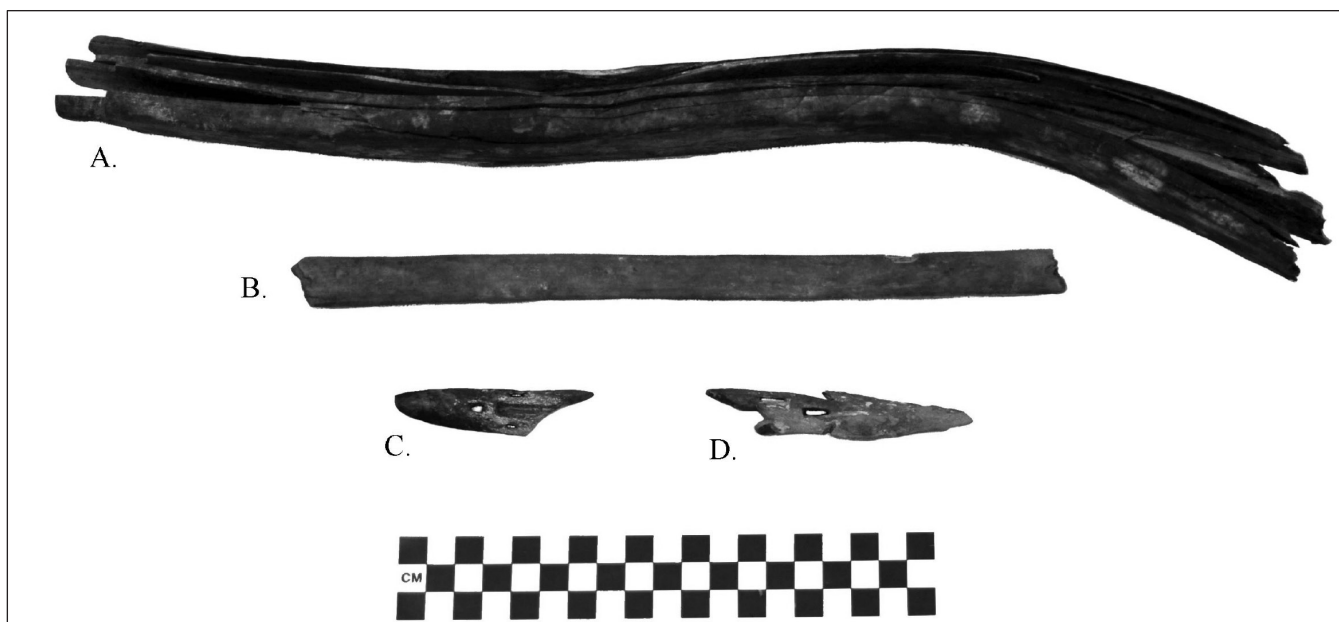


Figure 6. Meat Cache 35 artifacts dated and described above.

a classic Thule assemblage (cf. Mathiassen 1927); however, others are more characteristically Punuk, which stands to reason given the prehistoric occupations on St. Lawrence Island following the Okvik/Old Bering Sea period were primarily Punuk affiliated (Ackerman 1962; Blumer 2002; Mason 2000b). These dates then may undermine the original interpretation of the assemblage and therefore those of the site. Thus, the more profound use of these data lie in their specific context, which can be used to establish a new baseline to reassess our understanding of Kukulik.

### A TEMPORAL AND SPATIAL REASSESSMENT OF KUKULIK

The only other Thule occupation on St. Lawrence Island was briefly proposed by Giddings (1952) from a stone house at Kitnepaluk, south of Gambell, although this assemblage has yet to be fully described and, of course, remains undated—the collection is also in the UAMN and awaits study. Collins (1937b:377) states that Thule-associated traits “appear quite suddenly on St. Lawrence Island.” The dates acquired from MC 35 fit well with Blumer’s (2002) proposal that the “Thule” (or “late Punuk”) horizon on St. Lawrence Island resulted from the interaction between Punuk and Birnirk<sup>3</sup> peoples sometime around AD 1200 to

1400. The question of Thule origins is a much broader question that cannot be adequately addressed in this paper (cf. Mason and Bowers 2009; Morrison 1991). However, given a more secure temporal understanding of the Kukulik mound, it will be possible to address the timing and persistence of different occupations. Following this, then, the various assemblages represented within Kukulik can be more securely compared to other Bering Strait chronometric datasets. Thus, the next step in this analysis involves considering the state of the chronology of Kukulik and its relationship to MC 35.

### THE CHRONOLOGICAL ASSESSMENT OF THE KUKULIK MOUND

The initial attempts to establish a cultural chronology of the Kukulik mound were, as suggested above, based primarily on the sequential stratigraphic placement of typologically “diagnostic” artifacts. In their summary, Geist and Rainey (1936:224) state that “the objective in this report is a stratigraphic study of the deposit,” in order to outline “six cultural phases, or periods of deposition... designated by the terms modern, recent-prehistoric, Thule, Punuk, Birnirk and Old Bering Sea” (Geist and Rainey 1936:224–225). This assessment was, and to some

3. There is limited, if any, concrete evidence for a Birnirk presence on St. Lawrence Island (cf. Mason 2000b), despite assessments to the contrary (Geist and Rainey 1936). The best documented occurrence is the Punuk-related occupation at the S’keliyuk site, which may exhibit strong influence of Birnirk (Ackerman 1961).





Figure 7. Harpoon heads dated by Mason in 2000 and 2004.

degree still is, accepted as a valid interpretation. While the stratigraphy-based progression that Rainey proposed generally coincides (despite the Thule dispute mentioned above) with the work by Collins (1937a, 1937b, 1939), more recent investigations have suggested that these relationships were not so clear (Blumer 2002). Likewise, the definition of a Birnirk presence on St. Lawrence Island has, over the years, fallen in and out of favor (Ackerman 1962, 1984; Gerlach and Mason 1992; Mason 2000b), while the possibility of a Thule presence there is generally disregarded (Ackerman 1984, Mason and Bowers 2009) and is only suggested in one other instance (Giddings 1952).

Aside from the assertion (Geist and Rainey 1936; Rainey 1936) that the site was abandoned sometime in the late 1880s due largely to a well-documented, island-wide famine (Crowell and Oozevasuk 2006; Mudar and Speaker 2002) no other absolute dates could be securely assigned to the deposit. In his review of the preliminary report, Collins (1939:480) disagrees with a temporal assessment by Rainey of the “recent-prehistoric” stage at Kukulik as occurring “somewhat prior to [AD] 1649.” Collins (1939:480) posits, instead, that an eighteenth-century date would be more appropriate. The only other pioneering attempt at a definitive chronology of Kukulik was that of Giddings in 1939. Following the dendrochronological analysis of structural members from a series of houses on the surface of the mound, Giddings (1942) constructed an occupational history from measurements on wooden artifacts from the Kukulik excavations. Using

tree end rings as limiting dates, Giddings (1942:82) dated “the upper 3 to 4 feet [91 to 122 cm] of midden” between AD 1629 and 1873 and established that the last occupation occurred between AD 1709 and 1876 (Giddings 1942:81).

The next attempt to date Kukulik did not occur until over sixty years later. Between 2000 and 2004, Mason submitted four artifacts from Kukulik for radiocarbon dating. Keeping with the “index fossil” approach used by Geist and Rainey (1936) and others, the four dates acquired by Mason were all on harpoon heads illustrated in the report and considered representative of one of the cultures reported for the site (Fig. 7). The intention was to establish a more secure understanding of the stratigraphic and/or occupational details of the site by testing the previous interpretations through modern methods (Mason 2000a). While three of these artifacts have depth-specific provenience data associated with them, it remains difficult to tie these measurements to the site. Two of the harpoon heads were originally excavated from the test trench, although only one of them has provenience data. The first (1-1933-8692, Fig. 7, A) resembles a type Ily and is dated to  $1980 \pm 40$  BP (calibrated to 87–78 BC, 55 BC–AD 91, AD 99–124, Beta-196352). Similar types of harpoon heads found at Kukulik, all from the same general area and depth, are described as being “associated with the Birnirk type” (Geist and Rainey 1936:176). The second (1-1935-8992, Fig. 7, B) is described as having been “washed out on the beach” (UAMN accession catalog 1933). It is almost identical in style to the previously described item, with one notable difference: faint, incised curvilinear decoration known as Old Bering Sea. It is dated to  $2110 \pm 40$  BP (cal. AD 991–1152, Beta-144992). The third harpoon head (1-1935-0115, Fig. 7, C), is from the northeast beach slope trench. It is a closed socket type Vy with characteristic incised Punuk designs and is dated to  $1680 \pm 40$  BP (cal. AD 1323–1468, Beta-144990). The final harpoon head (1-1935-8676, Fig. 7, D), has provenience, yet its association is difficult to interpret. It resembles a type III(b)x, with a triangular line hole and lashing slots and is dated to  $1110 \pm 40$  BP (cal. AD 783–787, 817–843, 860–1018, Beta-144991).

The present study has produced the only other radiocarbon dates relating directly to the site of Kukulik; those are the four acquired from the MC 35 assemblage as discussed above (Table 2). Several other circumstances must be considered before attempting to construct a provisional chronology from the admittedly limited radiometric data—eight  $^{14}\text{C}$  ages in total (see Fig. 8). Two



guide posts are available: working backwards, or from the top down, it is well established that the site was ultimately abandoned during the years AD 1878–1880, a result of the island-wide famine. The dendrochronology work on house timbers by Giddings (1942) supports this inference in that the youngest dates for house construction/modification fall around AD 1876 (Giddings 1942). That same effort provided a lower limit of AD 1709 for the upper levels of the mound, which contained the “recent-prehistoric” and “modern” phases of occupation.

In discussing the relationship of the MC 35 artifacts to the rest of the site, Geist and Rainey (1936:191–192) propose that it was used before the occupation of the third house, the floor of which was 2.7 m below the surface of the mound. In analyzing the artifacts collected from the various structures discovered in the test trench, Geist and Rainey (1936) noted a corresponding separation between the “modern” material culture represented in the first house and the “recent-prehistoric” material found in the second and third houses. When averaged, the four MC 35 dates produce a radiocarbon age of  $522 \pm 20$  BP (calibrated cal. AD 1333–1336, 1397–1438). This supports Geist and Rainey’s (1936) suggestion, and places construction, and therefore occupation, of the third house after the mid-to-late fourteenth century AD.

If the occupational history that Giddings established from artifacts is considered, the lower age limit for the upper 1 m of midden (including artifacts from the first and second houses in the test cut<sup>4</sup>) is AD 1629, suggesting an approximate two-hundred-year time span between occupations related to MC 35 and the second house.

As discussed previously, Rainey (in Geist and Rainey (1936:86–87) proposed a cultural chronology for Kukulik based on the stratigraphic position of various artifact types, predominantly harpoon heads. As a test of Rainey’s initial assessment a tentative comparison can be offered, linking the radiometric data with the stratigraphic charts of Geist and Rainey (1936:185, 199). Rainey’s first chart (from p. 185) shows depth below surface with only specimens in the lower levels of the test cut. One of the dated specimens, the undecorated Ily harpoon head (1-1933-8692), was found with a bone slat armor fragment “at a depth of 11 feet 7 inches [3.53 m]” (Geist and Rainey 1936:183). Based solely on this single artifact, this layer may date as early as the last century BC or ca. AD 1. As

mentioned above, the second ivory harpoon head was from the test cut (1-1935-8992) but it had no precise provenience, making it difficult to assess; its <sup>14</sup>C age, while greater than 2000 BP, required old carbon corrections that placed its age nearly a millennium younger, ca. AD 1000. Building on the tentative chronology proposed here, and focusing primarily on evidence relating to the test trench, the site was likely occupied sometime prior to ca. AD 1.

Turning to the second chart, labeled Map 7 by Geist and Rainey (1936:199) which presents the dated specimens, the decorated, closed-socket Vy harpoon head (1-1935-0115) was found in the wall of the northeast beach slope trench 1.22 m “above clay” (according to the UAMN accession record 1935). Based on the age of this artifact, this layer would date to the late fourteenth or the early fifteenth century AD, broadly contemporaneous with the occupation that produced MC 35. The provenience for the fourth specimen, a Late Punuk III(b)x harpoon head (1-1935-8676) is described as “23 in [58.4 cm] deep 52' E.T. 15' N” (UAMN accession record 1935). Using only the depth information associated with this artifact, this part of the upper levels of the deposit should date between the late seventh century AD and ca. AD 1025—minimally, hundreds of years earlier than even the earliest AD 1629 dendrochronological assessment for the same level. Clearly, without more secure control over the spatial and stratigraphic relationships between artifacts within the mound, there remain considerable ambiguities with the extant radiometric data.

#### TOWARDS A SPATIAL RECONSTRUCTION OF THE KUKULIK MOUND

One of the unstated issues in relating artifacts from Kukulik to each other (as in the example above) is the complex stratigraphy and the sheer size of the mound. Simply stating that an artifact was excavated “x” number of feet or inches below the surface is grossly insufficient for comparative purposes. Without greater control over the horizontal placement of artifacts within the mound, individual artifacts are of limited use in establishing its chronology. Dating an “index fossil” is inherently problematic, even without considering issues related to artifact curation or taphonomy. The question of dating features, however, is potentially another matter. Aside from the

4. During excavation of the initial test trench, a series of houses were discovered stratigraphically superimposed upon one another (see Fig. 10). Unfortunately no construction-related wood was collected, thus restricting the dendrochronology efforts to wooden artifacts collected from them (Giddings 1942:82).

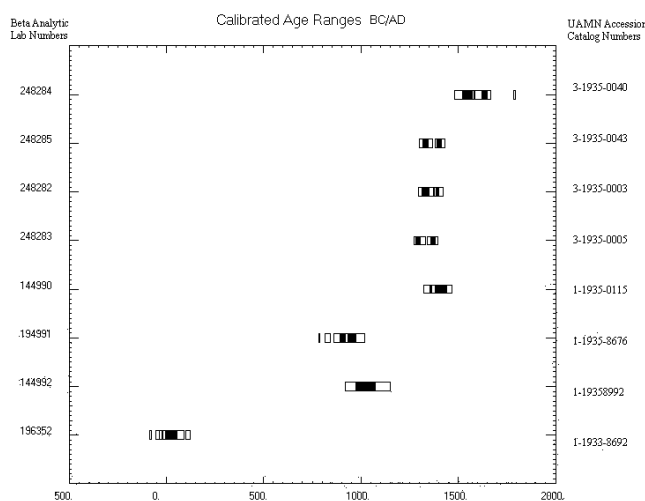


Figure 8. Calibrated radiocarbon dates from Kukulik.

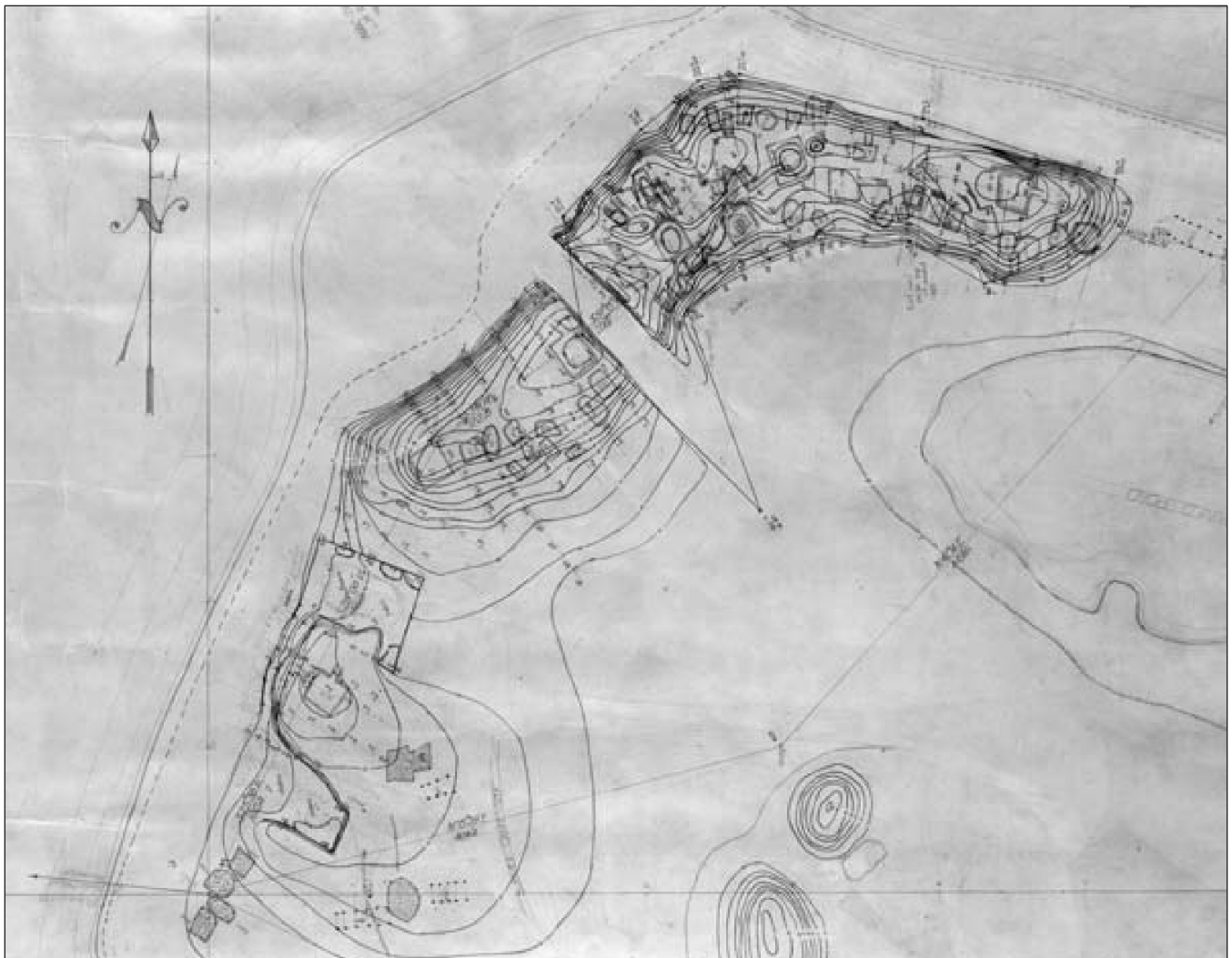
limited stratigraphic discussions by Geist and Rainey (1936), few attempts have addressed the mound in terms of spatial context of features and/or individual artifacts (Houlette 2008; Lewis 1995). In fact, most researchers have assumed that the spatial data from the excavations is either insufficient for such investigations or simply non-existent (Blumer 2002; Gerlach and Mason 1992; Lewis 1995). In an extreme, negative assessment of the collection, Smith et al. (1978:22) stated that “in many instances the data retrieval methods employed were inadequately organized and much valuable information has been lost or neglected, rendering a great deal of the collection useless for anything more than gross comparative studies.” Statements such as this—which analysis shows to be a gross overstatement—have inspired the final aspect of the current study.

During the UAMN rehousing effort, all the relevant documentation concerning the Kukulik excavations and collections was reviewed and reorganized to explore and develop any future research potential. As a result, considerable spatial data were located primarily in the Alaska and Polar Regions Department at Rasmuson Library, University of Alaska Fairbanks. The foremost discovery is a series of hand-drawn charts compiled from transit measurements taken during the original excavations. One of these charts (Fig. 9) was created in 1935 by Olavi Kukkola (1935a), the surveyor during the 1935 excavations, and served as the template used for producing the less-detailed plan view map (e.g., Fig. 2) of the site included in the preliminary report (Geist and Rainey 1936:54). This chart provides in a two-dimensional plan view details such as topographic relief of the mound and the locations of each

of the features encountered and excavated at the site (Fig. 9). Also, the chart provides elevation, bearing, and distance measurements for each of the survey stations and the location of the Bering Sea shoreline at sea level.

Another important discovery was the field notebooks of the two surveyors who recorded the measurements used to construct the chart. These notebooks were previously known; however, without the chart for reference, these data seemed extraneous. One of the most useful aspects of these data is the location of the survey station(s) from the various features originally measured. Equally important are the detailed measurements relating each of the survey stations to one another across the site. Throughout the excavation, the locations of each of the survey stations were pedestalled and preserved as datum points for continued measurements (e.g., see Geist and Rainey 1936:248). Much of the data in the notebooks concerning the locations of the various features relates to the datum points and can be used to securely link each one. As mentioned above, the description of MC 35 suggests that it was discovered 1.52 m below the surface underlying meat caches 20 and 21 (Geist and Rainey 1936:191). Examining the site map, caches 20 and 21 were located on the southern slope of the mound ca. 19 m northeast of the test trench. This location can be further refined from the bearing, distance, and elevation data recorded in the field notebooks of Olavi Kukkola (1935b:14). In combination with the chart mentioned above, the precise location of the MC 35 feature was identified and is plotted on a copy of the chart (see Fig. 2).

A second chart located during the rehousing effort is the original version of the test trench profiles (Fig. 10). This chart was compiled in 1933 by H. R. Linck and J. E. Walsh from field notes and measurements recorded during excavation. In addition to a standard vertical profile, it includes a plan view of the excavation and the recent house, as well as a three-dimensional perspective sketch. Like the site map, sections of this chart were presented in considerably less detail in the preliminary report (Geist and Rainey 1936:40). Some of the more salient details included on the original describe the placement and description of the framework used to support the wire grid, as briefly related in the report and presumably used for provenience measurements (Geist and Rainey 1936). To date, little work has been done with this information, but it seems to have the potential to unlock some of the questions relating to the precise provenience of the features and artifacts found in the test trench.



*Figure 9. Detail of the original survey chart (Kukkola 1935a).*

## CONCLUSIONS

What is the possibility of a Thule presence at Kukulik? This paper focused on one of the initial justifications for such an assessment, the Meat Cache 35 assemblage. Despite opposition from his contemporaries, Rainey (1936:361–362) maintained not only that there was such a presence, but that this was the initial stage “in the development of a ‘Thule Culture Complex.’” This hypothesis, however, was not solely based on the MC 35 materials but also noted the “presence, in three different sections of the mound, of ‘Thule type’ harpoons in strata below Recent-Prehistoric” (Rainey 1936:360). The reanalysis described here does not support Rainey’s claims, at least in considering the existing very limited radiometric data. However, these data should assist in establishing an improved understanding of the nature and timing of the various occupations at

Kukulik. Further, an important lesson from the study is that much can be learned from analyses of archived “legacy” collections. Needless to say, more archival research and chronometric dating of museum samples needs to be done, for as discussed, the interpretations regarding the cultural occupations and interactions of the Bering Strait regions are still being debated, despite nearly a century of investigations. Museums remain the best hope for archaeological inferences about Kukulik, since the depredations of subsistence diggers (Staley 1993) limit the potential for additional research at the mound. Investigations such as this reanalysis, aimed at distinct sections or features of the collection and using more current methods, will certainly increase our understanding not only of Kukulik, but of Bering Strait prehistory.

During Geist’s excavations, approximately 50,000 artifacts were collected from Kukulik and are currently



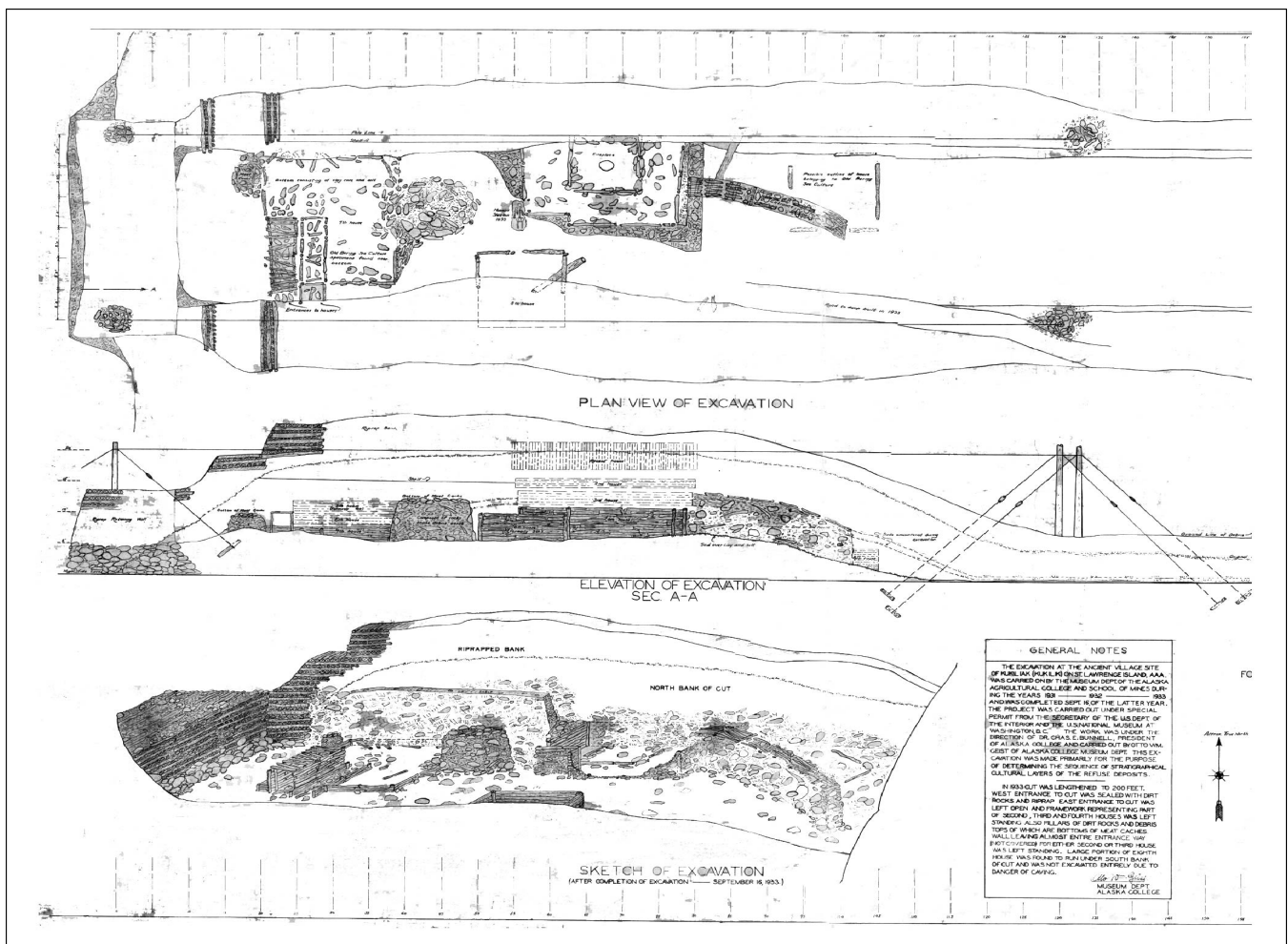


Figure 10. Detail of the original test trench chart (H. R. Linck and J. E. Walsh 1933).

housed at the UAMN. These collections are one of the largest accumulations of archaeological materials from a single site in the Bering Strait region. Yet the importance of this site to Bering Strait prehistory lies not in the number of collected artifacts but in the potential to trace the sequence of development of Eskimo culture. Kukulik was described by Collins (1939:479) as “the former center of population on St. Lawrence Island, where prehistoric Eskimo culture was marked by extreme complexity and mutability.” Despite this widely proclaimed importance, it is notable how few researchers have even examined the collection. Ultimately, Kukulik is far from fully analyzed. Numerous artifacts remain unclassified at the most basic levels such as type or material. Aside from the single *preliminary* report—an admission few archaeologists remember (Geist and Rainey 1936), and an unpublished Ph.D. dissertation (Lewis 1995) the site is typically mentioned in passing, without full consideration. Certainly, many problems remain with the collection, especially where detailed

contextual data are concerned, yet the collections may not be as limited as is usually assumed.

This paper describes the recent effort to address some of the more obvious pitfalls in using the Kukulik collection, including its reorganization and in arranging the associated documentation. With these collections rehoused and reorganized it is now possible to examine the materials in a more efficient manner than ever before. The rediscovery and reanalysis of the MC 35 assemblage was possible only as a result of these efforts. This study has doubled the radiocarbon data for the site, and in conjunction with a review of the existing spatial and chronometric data, I proposed a few guide posts for the last 2,000 years of occupation at Kukulik. The initial settlement at Kukulik might date from the last centuries BC; the strongest evidence for occupation is from the fourteenth to nineteenth centuries AD. For a massive site the size of Kukulik, the result remains unsatisfying to fully understand the complexity of the mound. This project is best

considered as a pilot study, one aimed at outlining the potential value of and in inspiring renewed investigation into the voluminous Kukulik collections.

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## REFERENCES

- Ackerman, Robert E.  
1961 Archaeological Investigations into the Prehistory of St. Lawrence Island, Alaska. Unpublished Ph.D. dissertation, Department of Anthropology, University of Pennsylvania, Philadelphia.  
1962 Culture Contact in the Bering Sea: Birnirk-Punuk Period. In *Prehistoric Cultural Relations Between the Arctic and Temperate Zones of North America*, edited by John M. Campbell. *Arctic Institute of North America Technical Paper* 11. Montreal.  
1984 Prehistory of the Asian Eskimo Zone. In *Handbook of North American Indians*, vol. 5, *Arctic*, edited by David Damas, pp. 106–118. Smithsonian Institution Press, Washington, DC.
- Arundale, Wendy H.  
1981 Radiocarbon Dating in the Eastern Arctic: A Flexible Approach. *American Antiquity* 46 (2):244–271.
- Blumer, Reto  
2002 Radiochronological Assessment of Neo-Eskimo Occupations on St. Lawrence Island, Alaska. In *Archaeology in the Bering Strait Region: Research on Two Continents*, edited by Don E. Dumond and Richard L. Bland. *University of Oregon Anthropological Papers* 59:61–106.
- Collins, Henry B.  
1937a Archaeology of St. Lawrence Island, Alaska. *Smithsonian Miscellaneous Collection* 96(1).  
1937b Culture Migrations and Contacts in the Bering Sea Region. *American Anthropologist* 39(3):375–384.  
1939 Review of Archaeological Excavations at Kukulik, St. Lawrence Island, Alaska, by Otto Geist and Froelich Rainey. *American Anthropologist* 41(3):479–481.
- Crowell, Aron L., and Estelle Oozevaseuk  
2006 The St. Lawrence Island Famine and Epidemic, 1878–80: A Yupik Narrative in Cultural and Historical Context. *Arctic Anthropology* 43(1):1–19.
- deLaguna, Frederica  
1939 Review of Archaeological Excavations at Kukulik, St. Lawrence Island, Alaska, by Otto Geist and Froelich Rainey. *American Antiquity* 4(3):288–291.
- Dumond, Don E.  
1977 *The Eskimos and Aleuts*. Thames and Hudson, London.
- Dumond, Don E., and Dennis G. Griffin  
2002 Measurements of the Marine Reservoir Effect on Radiocarbon Ages in the Eastern Bering Sea. *Arctic* 55(1):77–86.
- Ford, James A.  
1959 Eskimo Prehistory in the Vicinity of Point Barrow, Alaska. *Anthropological Papers of the Museum of Natural History*, volume 47, part 1, American Museum of Natural History, New York.
- Geist, Otto W., and Froelich Rainey  
1936 Archaeological Excavations at Kukulik, St. Lawrence Island, Alaska. Government Printing Office, Washington, DC.
- Gerlach, S. Craig, and Owen K. Mason  
1992 Calibrated Radiocarbon Dates and Cultural Interaction in the Western Arctic. *Arctic Anthropology* 29(1):54–81.
- Giddings, James L.  
1942 Dendrochronology in Northern Alaska. *University of Arizona Bulletin* volume XII, number 4, Tucson, AZ, and University of Alaska Publication IV, Fairbanks.  
1952 Round Houses in the Western Arctic. *American Antiquity* 18(2):121–134.



- Giddings, J. Louis, and Douglas D. Anderson  
1986 Beach Ridge Archaeology of Cape Krusenstern: Eskimo and Pre-Eskimo Settlements around Kotzebue Sound, Alaska. *Publications in Archaeology* 20. National Park Service, U.S. Department of the Interior, Washington, DC.
- Houlette, Chris  
2008 Reconstructing Kukulik: Continued Efforts, Further Realizations and New Insights. Paper presented at the 35th annual meeting of the Alaska Anthropological Association, Anchorage.
- Hughen, K.A., M.G.L. Baillie, E. Bard, A. Bayliss, J.W. Beck, C.J.H. Bertrand, P.G. Blackwell, C.E. Buck, G.S. Burr, K.B. Cutler, P.E. Damon, R.L. Edwards, R.G. Fairbanks, M. Friedrich, T.P. Guilderson, B. Kromer, F.G. McCormac, S.W. Manning, C. Bronk Ramsey, P.J. Reimer, R.W. Reimer, S. Remmele, J.R. Southon, M. Stuiver, S. Talamo, F.W. Taylor, J. van der Plicht, and C.E. Weyhenmeyer  
2004 Marine04 Marine Radiocarbon Age Calibration, 26–0 ka BP. *Radiocarbon* 46:1059–1086.
- Kukkola, Olavi  
1935a Chart of Kukulik, map number 03614. Alaska and Polar Regions Department, Rasmuson, Library, University of Alaska Fairbanks.  
1935b Field Book II, Field Book Containing Data for Surveys on St. Lawrence Island. Otto Geist Collections, Archaeology Department, University of Alaska Museum, Fairbanks.
- Lewis, Michael A.  
1995 Technological Development and Culture Change on St. Lawrence Island. Unpublished Ph.D. dissertation, Department of Anthropology, University of Alaska Fairbanks.
- Linck, H.R., and J.E. Walsh  
1933 Chart of Kukulik test trench, map number 03791. Alaska and Polar Regions Collections, Rasmuson, Library, University of Alaska Fairbanks.
- Mason, Owen K.  
2000a Notes Relating to Radiocarbon Dating of Kukulik Artifacts. Archaeology Department, University of Alaska Museum, Fairbanks.  
2000b Ipiutak/Birnirk Relationships in Northwest Alaska: Master and Slave or Partners in Trade? In *Identities and Cultural Contacts in the Arctic*, edited by Martin Appelt, J. Berglund, and H.C. Gulløv, pp. 229–251. Danish National Museum and Danish Polar Center, Copenhagen.
- 2004 Notes Relating to Radiocarbon Dating of Kukulik Artifacts. Archaeology Department, University of Alaska Museum, Fairbanks.
- Mason, Owen K., and Peter Bowers  
2009 The Origin of Thule Is Always Elsewhere: Early Thule within Kotzebue Sound, Cul de sac or Nursery? In *On the Track of the Thule Culture: New Perspectives in Inuit Prehistory. An International Symposium in Honor of Research Professor H. C. Gulløv*, pp. 25–44, SILA, Danish National Museum, Copenhagen.
- Mathiassen, Therkel  
1927 The Thule Culture and Its Position within the Eskimo Culture. In *Archaeology of the Central Eskimos*, 2 vols., *Report of the Fifth Thule Expedition 1921–24*. Vol. 4(1–2). Gyldendal, Copenhagen.
- McGhee, Robert  
2000 Radiocarbon Dating and the Timing of the Thule Migration. In *Identities and Cultural Contacts in the Arctic*, edited by Martin Appelt, J. Berglund, and H.C. Gulløv, pp. 181–191. Danish National Museum and Danish Polar Center, Copenhagen.
- Morrison, David  
1991 The Diamond Jenness Collections from Bering Strait. *Archaeological Survey of Canada Mercury Series Paper* 144. Canadian Museum of Civilization, Hull, QB.
- Mudar, Karen, and Stuart Speaker  
2003 Natural Catastrophes in Arctic Populations: The 1878–1880 Famine on Saint Lawrence Island, Alaska. *Journal of Anthropological Archaeology* 22:75–104.
- Murray, Maribeth S., A.C. Robertson, and R. Ferrara  
2003 Chronology, Culture, and Climate: A Radiometric Re-evaluation of Late Prehistoric Occupations at Cape Denbigh, Alaska. *Arctic Anthropology* 40(1):87–105.
- Nelson, Edward W.  
1983 [1899] *The Eskimo About Bering Strait*. Smithsonian Institution Press, Washington, DC.
- Potter, Ben A.  
2008 Radiocarbon Chronology of Central Alaska: Technological Continuity and Economic Change. *Radiocarbon* 50(2):181–204.
- Rainey, Froelich G.  
1936 Eskimo Chronology. *Proceedings of the National Academy of Sciences of the United States of America* 22(6):357–362.

- Reimer, P.J., M.G.L. Baille, E. Bard, A. Bayliss, J.W. Beck, C.J.H. Bertrand, P.G. Blackwell, C.E. Buck, G.S. Burr, K.B. Cutler, P.E. Damon, R.L. Edwards, R.G. Fairbanks, M. Friedrich, T.P. Guilderson, A.G. Hogg, K.A. Hughen, B. Kromer, G. McCormac, S. Manning, C.B. Ramsey, R.W. Reimer, S. Remmele, J.R. Southon, M. Stuiver, S. Talamo, F.W. Taylor, J. van der Plicht, and C.E. Weyhenmeyer  
2004 IntCal04 Terrestrial Radiocarbon Age Calibration, 0–26 cal. KYR BP. *Radiocarbon* 46(3):1029–1058.
- Schledermann, Peter, and Karen McCullough  
1980 Western Elements in the Early Thule Culture of the Eastern High Arctic. *Arctic* 33(4):833–841.
- Smith, George S., Z.A. Bradley, R.E. Kreher, and T.P. Dickey  
1978 The Kialegak Site, St. Lawrence Island, Alaska. *Occasional Paper* 10, Anthropology and Historic Preservation Cooperative Park Studies Unit, University of Alaska Fairbanks.
- Stanford, Dennis  
1976 The Walakpa Site, Alaska: Its Place in the Birnirk and Thule Cultures. *Smithsonian Contributions to Archaeology* 20.
- Staley, David P.  
1993 St. Lawrence Island's Subsistence Diggers: A New Perspective on Human Effects on Archaeological Sites. *Journal of Field Archaeology* 20(3):347–355.
- Stuiver, M., P.J. Reimer, and R. Reimer  
2006 Calib <sup>14</sup>C Radiocarbon Calibration Program. <http://calib.qub.ac.uk/calib/>, accessed March 2, 2009.
- University of Alaska Museum of the North Accession Catalogs  
1933 Catalog of the Collections from the Alaska College Bering Sea Expedition.  
1935 Catalog of the Collections from Kukulik, St. Lawrence Island.
- Yama'ura, Kiyoshi  
1984 Toggle Harpoon Heads from Kurigitavik, Alaska. *Bulletin of the Department of Archeology* 3:213–262. University of Tokyo, Tokyo.