

# THE ARCTIC SMALL TOOL TRADITION FIFTY YEARS ON

Daniel Odess

University of Alaska Museum, 907 Yukon Drive / Box 756960, Fairbanks, Alaska 99775. [ffdpo@uaf.edu](mailto:ffdpo@uaf.edu)

**Abstract:** The Arctic Small Tool tradition (ASTt) encompasses several culture complexes in Alaska, Canada, and Greenland. Research on the Alaskan members of the tradition has not kept pace with that in the rest of the North American Arctic. Despite the passage of more than fifty years since its discovery, there is still a great deal we do not know about the Denbigh Flint Complex, and much of what we think we know is based on received wisdom and ethnographic analogy rather than direct archaeological evidence. This paper assesses the state of our knowledge about the ASTt in Alaska and situates it within the broader framework of Arctic prehistory.

**Keywords:** Alaska Archaeology, Arctic Prehistory, Middle Holocene, Denbigh Flint Complex

Nearly fifty years ago, a young William Irving reflected on the similarities between the small, delicately flaked stone tools that had recently been discovered in Alaska (Giddings 1949, 1951), Canada (Giddings 1956; Harp 1958), and Greenland (Knuth 1954; Larsen and Meldgaard 1958; Meldgaard 1952), and suggested that they shared a common historical origin. Aware of the need for consistency in archaeological systematics and classification, he proposed that those tools belonged to a single technological *tradition*, which he aptly termed Arctic Small Tool (Irving 1953, 1957, 1962, 1964, 1969/1970; Julig and Hurley 1988).

Since Irving first defined the Arctic Small Tool tradition (ASTt) as an archaeological construct, there have been numerous methodological advances, chief among them radiocarbon dating. Hopkins' and Giddings' (Giddings 1955; Hopkins and Giddings 1953) initial view that Iyatayet, the Denbigh type site, dated to at least 8500 years ago has been disproven, as has Collins' (1953) belief that Denbigh dated to between 6000 and "little more than 8000 years" ago. The difficulties with dating bone and antler that plagued the discipline throughout the 1960s and 1970s have been recognized, explored, and resolved (Brown et al. 1988). The marine reservoir has been recognized as a source of old carbon and, by extension, anomalously old dates in the Arctic (Arundale 1981; Dumond and Griffin 2002; Dyke et al. 1996; McGhee and Tuck 1976). The need to calibrate radiocarbon dates to facilitate comparisons between data sets has been rec-

ognized and our ability to do so realized (Reimer et al. 2004; Stuiver et al. 1998). Accelerator mass spectrometry (AMS) has been developed and now permits us to date minute samples of organic matter from sites that would have been undateable in 1980. Equally important, AMS permits us to choose samples for dating based on the most appropriate context and association rather than on the basis of sample size. Sophisticated and increasingly detailed reconstructions of past environments now allow us to both situate humans on the landscape and to study how they have responded to past climate change at a variety of spatial and temporal scales. While problem-driven research is increasingly common in ASTt studies, basic culture history remains a fundamental concern because the time-space dynamics of prehistoric cultural manifestations in many parts of the Arctic are still poorly known.

One development that has had significant consequences for archaeology in the Arctic in general and Alaska in particular is the end of the Cold War. Communication across Bering Strait, once nearly impossible, is again routine as indeed it probably was in Arctic Small Tool times. The idea for this volume arose in a session on the Arctic Small Tool tradition organized for the Fifth International Congress of Arctic Social Scientists (ICASS-V) held in Fairbanks in 2004. With support from the Office of Polar Programs at NSF, several Canadian and Russian researchers were able to attend that conference and to share the results of their own work with an inter-

national audience. Such exchanges are now routine, but were virtually unheard of in Irving's day. Given the presence of Denbigh-like tools, particularly burins, in Neolithic sites in Siberia (Collins 1954), one wonders how conceptions of and work on the ASTt might have differed had Irving and his colleagues, particularly Louis Giddings, had greater access to researchers working in Northeast Asia.

## TRADITIONS AND TRAJECTORIES

It seems appropriate in a volume such as this to comment briefly on the use the Arctic Small Tool *tradition* has had as an archaeological construct since Irving's day. Irving's original concept was one of geographic breadth, encompassing as it did archaeological material from Alaska to Greenland. Despite the lack of firm dating at the time, we now know that the archaeological complexes Irving included within his Arctic Small Tool tradition all date to within several centuries of one another. In Canada and Greenland, they span a period of a little over a millennium. Irving's definition was broad with respect to geography, but it was not deep with respect to time. In this sense, he was clear about historical relationships between a series of individually identified and more or less contemporaneous archaeological cultures over space, but did not intend his conceptual tool to trace what became of them over time. For Irving, ASTt in Alaska was largely restricted to the Denbigh Flint Complex.

In the years since then, considerable new evidence has come to light in both the eastern and western North American Arctic that bears on the taxonomic status of various complexes including Denbigh, Pre-Dorset, Independence I, and Saqqaq (see Helmer 1994b for discussion of the Eastern Arctic data), and, more importantly, on issues of cultural continuity and change between these and later cultures (e.g., Anderson 1980). In Canada and Greenland, the picture that has emerged is one of periodic depopulation and recolonization of large areas, but overall continuity at the regional level between the members of the Arctic Small Tool tradition as originally defined, and the subsequent Dorset culture (Odess 2002). It is now common among those working in the Eastern Arctic to refer to Independence I, Pre-Dorset, and Saqqaq as "early Paleoeskimo" or "early ASTt," Independence II and Groswater Dorset as "transitional," and the derivative Dorset culture as "late Paleoeskimo" or "late ASTt."

In Alaska, the relationships between the original ASTt member complex, Denbigh, and contemporary and subsequent cultures are less clear cut. Irving's definition of a Punyik Complex of the ASTt as distinct from Denbigh

did not endure, and in post-dissertation years he referred to the ASTt material from Etivlik Lake as Denbigh. In a paper published in 1980, Anderson modified Irving's original construct of the Arctic Small Tool tradition to focus not on geographic breadth, but on temporal depth, and used it to articulate what he felt was a period of cultural continuity in northwestern Alaska that began with Denbigh and derived the subsequent Choris, Norton, and Ipiutak cultures from it. Such treatment is consistent with *tradition* as a conceptual tool as defined by Willey and Phillips (1958), but it is at odds with how Irving originally defined ASTt and how it has been used in Alaskan archaeology since then. The issues involved in identifying cultural continuity and change are complex, and they hinge in large measure on what sorts of materials are and are not preserved archaeologically, the geographic scale at which questions are being asked, and what lines of evidence individual researchers view as most telling. Anderson's interpretation is not universally accepted, particularly when the area of concern extends beyond northwestern Alaska. The principal difficulty with Anderson's reformulation of ASTt is that, since it was originally defined as a concept with tremendous geographic breadth, most researchers continue to use it in that fashion. The decision to retain the term while changing the emphasis to temporal depth and a relatively narrow geographic focus therefore introduces unnecessary confusion into the literature because of inconsistency in how the term *tradition* is used as a conceptual tool.

It is for this reason, despite being Anderson's student, that I have elected to retain Irving's original definition and, with a single exception, to include in this volume only papers that focus on cultures falling within Irving's original definition. That exception is the Darwents' paper on Old Whaling, long seen as one of the more enigmatic Beringian cultures. It is included here because the culture termed (in my view inappropriately) Old Whaling probably plays a significant role in what becomes of the Arctic Small Tool tradition, at least in northwestern Alaska. Stone tools that would be at home in the Old Whaling collection from Cape Krusenstern (Giddings and Anderson 1986) are found throughout much of the Noatak drainage and, as the Darwents note, some of the tools from the type site are made from Wrench Creek chert. Rather than a maritime-focused group who arrived by boat at Cape Krusenstern, we might instead consider whether the so-called Old Whalers are people who are best known from the coast, but who spent much of the year inland (Mason and Gerlach 1995).

## WHAT HAVE WE LEARNED?

So what have we learned about the Arctic Small Tool tradition in the past fifty years? In the last few decades, research on Denbigh, the principal Alaskan member of the tradition, has lagged far behind that on early Paleoeskimo culture(s) in Canada (Cox 1978, 1988; Helmer 1986, 1994a; LeBlanc and Nagy 2003; Maxwell 1973, 1976, 1985; McGhee 1976, 1979; Morrison and Pilon 1994; Nagy 2000; Schledermann 1990, 1996) and Greenland (Appelt et al. 2000; Appelt et al. 1998; Elling 1996; Grønnow and Pind 1996; Møbjerg 1999), where the discovery, meticulous excavation, and well-reported analysis of many ASTt sites, including a handful of frozen ones (Grønnow 1988, 1994, 1996), has dramatically advanced our understanding of Paleoeskimo material culture and economy. In terms of the numbers of researchers involved, the levels of funding, and the number of publications that have resulted, ASTt research in Alaska has not kept pace with that in Canada and Greenland.

However, one area where there have been significant advances in Alaskan ASTt research is the Alaska Peninsula and adjacent islands. A slow but steady trickle of publications from that region, many of them bearing the name of Don Dumond, suggests some form of ASTt distinct from Denbigh is present and appears to be characterized by a far more sedentary subsistence–settlement system than any of the ASTt complexes found farther north and east. Few things discourage a subsistence–settlement system based on mobility like the presence of productive and reliable salmon runs.

There are a number of things we still don't know about the Arctic Small Tool tradition in Alaska, in particular the timing of ASTt arrival on this side of Bering Strait. Most researchers seem to accept that ASTt people came from Northeast Asia (Powers and Jordan 1990). If true, we should expect the oldest North American dates for the ASTt to be in Alaska, and we should expect progressively younger dates as one moves east through arctic Canada and into Greenland. Yet, with very few possible exceptions (e.g., Harritt 1994; cf. Slaughter, this volume), Alaskan ASTt sites appear no older than the oldest sites in northeast Greenland, where a suite of dates on musk ox bone places Independence I people at ca. 4000 radiocarbon years ago (Elling 1996). There is also evidence in eastern Canada for an ASTt presence coeval with the early dates from Alaska. On Ellesmere Island

for example, Schledermann (1990) reports dates on willow charcoal and terrestrial mammal bone from two sites older than 3900 radiocarbon years in age. In Labrador, Cox (2003) reports an uncalibrated charcoal date of 3960 BP from a Pre-Dorset hearth.

Attempts to resolve the timing of ASTt arrival in North America are complicated by several factors. First, efforts to address the topic through application of radiometric dating are hampered by reversals in the abundance of atmospheric  $^{14}\text{C}$  during the period between 5000 and 4000 calendar years ago (Reimer et al. 2004). Thus, a single assay from this period may provide several possible ages for a given sample. An additional factor that may explain the counterintuitive contemporaneity of the oldest dated ASTt material in Greenland and Canada with that from Alaska is the lower visibility of small lithic scatters on the lushly vegetated (at least by the standards of northeast Greenland) Alaskan landscape. In contrast to the Alaskan situation, early ASTt sites do not readily escape detection on the barren gravel ridges of northeast Greenland when they are subjected to careful survey. At the same time, as Owen Mason (personal communication 2006) points out, eustatic sea-level rise on the Beringian platform has largely inundated any coastal sites that might have been occupied prior to ca. 4000 years ago in Alaska north of Nome. With few exceptions, the record of early ASTt on the coast in the western Canadian Arctic is similarly afflicted.

How long ASTt people were present in Alaska before they became archaeologically visible remains an open question. If, as seems likely, the origins of the ASTt are to be found in the Siberian Neolithic (Powers and Jordan 1990) there is still a significant chronological (and geographical) gap between Bel'kachi, dated to ca. 5000 B.P., and the earliest dated Denbigh sites in Alaska. In this regard, the anomalously early dates at Kuzitrin Lake (Harritt 1994), though not universally accepted, fill an important and otherwise puzzling void.<sup>1</sup> The hypothetical loss to erosion of coastal sites greater than 4000 years in age aside, I have little difficulty imagining small bands of Denbigh ancestors present on the Alaskan landscape and all but archaeologically invisible for several centuries before they arrived at Onion Portage roughly 3950 radiocarbon years ago. I suspect that what evidence exists of their earliest passing has either not yet been found, or has gone unrecognized as just another undated and seemingly insignificant lithic scatter.

<sup>1</sup>Some of the dates from Iyatayet, the Denbigh type site, are also significantly older than most of the ASTt dates that have been reported in North America (cf. Slaughter, this volume). However, these dates were run on solid carbon in the very early years of radiocarbon dating, prior to standardization of pretreatment techniques. As the multiple ages derived from individual samples indicate, it is impossible to determine the age of the Iyatayet material with any certainty using the available data.

We know almost nothing about the cultural dynamics that existed between the entrenched, interior-oriented people whom Anderson (1968) termed Northern Archaic and the people who are the focus of this volume. Interaction between Denbigh and Northern Archaic peoples was not limited to simple hostility, if indeed their relationships were hostile at all. As Anderson (this volume) notes, Denbigh people who camped at Onion Portage had gained access to Batza Téna obsidian, as had those who camped at Punyik Point (Kunz, this volume). The fact that no Denbigh remains have been reported from the vicinity of Batza Téna (Clark and Clark 1993) suggests that this access was achieved through trade and exchange relationships developed with Northern Archaic people, indicating a social dynamic more complex than either hostility or avoidance. One can't help but wonder what Denbigh people, with access to the coast and, perhaps, with continued ties to Northeast Asia, might have exchanged for Batza Téna obsidian and how demand for materials that could only be obtained through trade might have affected both cultures.

The slow rate of ASTt penetration into the interior, as evidenced by the near absence of Denbigh dates earlier than 4000 BP, suggests that, at least initially, Northern Archaic peoples deflected would-be ASTt colonists north along the coast and into Canada, as well as south into what remains largely the archaeological *terra incognita* of the Yukon–Kuskokwim Delta, from whence they ultimately reached the Alaska Peninsula and, perhaps, the Aleutians. The role of ASTt people in the prehistory of Kodiak and the Aleutian archipelago is a matter of some debate, as the diversity of views expressed on the topic in this volume (e.g., Dumond, Davis and Knecht, Slaughter, Steffian and Saltonstall) and elsewhere (e.g., Maschner and Jordan 2001) demonstrates.

Until recently, discussions of pre-Thule relationships between the Eastern Arctic and Alaska relied almost exclusively on lines of evidence drawn from tool technology and morphology. The revolution brought about by the increasingly routine practice of extracting, amplifying, and comparing ancient DNA has added an important new area of inquiry. In this regard, one recently published study indicates that late ASTt (Dorset culture) skeletal remains from Southampton Island in the Eastern Canadian Arctic have their closest genetic relationships not to Neoeskimo Thule people who migrated east from Alaska, but to the Aleuts found at the opposite end of the Arctic Small Tool world (Hayes et al. 2003, 2005; O'Rourke 2005). While it is clear that additional research is required to resolve the question of how much *cultural* influence the ASTt people had on the Aleutian Islanders, the research re-

ported by Hayes et al. suggests that the *biological* relationship between ASTt and Aleut populations is much closer than we suspected. While sample size continues to be a concern in such studies, these results are intriguing. Unfortunately, as of this writing, comparable genetic data on the human remains from the frozen Saqqaq site Qeqertasussuk, in West Greenland, have not been published, and no ASTt human remains have been reported in Alaska.

There is also a great deal that we don't yet know about Denbigh subsistence and settlement patterns. Suggestions that Denbigh people were on the coast in the summer but headed into the interior during colder months (e.g., Anderson 1988 and this volume; Giddings 1964) are both plausible and consistent with the ethnographically documented movement of groups living along the middle and upper Noatak River (Burch 1980, 1998). However, there is little in the way of actual archaeological evidence to support or refute this interpretation. Denbigh faunal remains, which might provide more direct evidence of site seasonality, are rare at most sites, both on the coast and in the interior. In their absence, it seems reasonable to invoke ethnographic analogy, but this form of archaeological explanation risks obscuring both variation and ingenuity in ancient human land use. If we look at how sites are located with respect to local and regional ecology and, in particular, in relation to seasonally variable availability of prey species, the picture becomes more nuanced. In the Brooks Range, for example, the Hicks Site (Odess 2003) and other sites in the vicinity of Primus Creek would provide their occupants access to abundant ground squirrels while awaiting the caribou that today arrive in late summer. Similarly, the Denbigh site at Punyik Point on Etivlik Lake (Irving 1964; Kunz, this volume) contains abundant but highly fragmented caribou bone and affords its occupants access to a reliable and predictable resource (fish, particularly lake trout) while awaiting the protein pulse of the August caribou migration. Whether people then remained in the vicinity of those sites throughout the winter is an open question. However, it is difficult to imagine them doing so without the ability to store a considerable quantity of food and, to date, caches have not been reported at Denbigh sites. Elsewhere in the Brooks Range, at Imaigenik, a site located in a dune complex near Anaktuvuk Pass, Irving (1953) reports abundant bone in association with Denbigh lithic material. Examination of bones from that site housed at the University of Alaska Museum confirms that they are caribou, but the lack of field notes with the collection precludes associating the faunal remains and the stone tools from the site with complete certainty.

The picture of ASTt subsistence and settlement patterns that is beginning to emerge is one of flexible systems in which land use is closely tied to local rather than regional ecology. ASTt people are often referred to as Palaeoeskimos because they were the first to adapt to year-round life on the arctic coast, including the frozen oceans of the far north (Odess 2005). Given the evidence in late ASTt sites in Canada (i.e., those of the early Dorset culture) for the use of snow knives to construct houses from blocks of snow (presumably out on the sea ice), I am inclined to wonder when this practice began, and whether Denbigh people in Alaska might have spent part of the year living out on the ice. Ice conditions in historic times have been such that Alaskan Eskimos did not do so, but perhaps we should entertain the idea that conditions were sufficiently different four thousand years ago to make such an adaptation possible or even advantageous. Indeed, if early ASTt people in Alaska were already familiar with life on the frozen ocean, that fact would go some distance to explaining the apparent rapidity with which they colonized the Canadian Arctic archipelago and Greenland.

#### ACKNOWLEDGEMENTS

I owe a special debt of thanks to Erica Hill for copy-editing the papers in this volume, and Don Dumond and Owen Mason for comments on this paper. Thanks are also due to Owen for his service as the general editor of the *Alaska Journal of Anthropology* since its inception. His willingness to permit others to guest-edit thematic volumes such as this is, in my view, a great strength of the journal and one that will help ensure its relevance and continued success. Finally, I'd like to thank both the contributors to this volume and the anonymous reviewers whose comments have strengthened the papers that follow.

## REFERENCES

- Anderson, D. D.  
1968 A Stone Age Campsite at the Gateway to America. *Scientific American* 218(6):24-33.
- 1980 Continuity and Change in the Prehistoric Record from North Alaska. In *Alaska Native Culture and History*, edited by H. Kotani and W. Workman, pp. 233-251. Senri Ethnological Studies, Vol. 4. National Museum of Ethnology, Osaka.
- 1988 Onion Portage: The Archaeology of a Stratified Site from the Kobuk River, Northwest Alaska. *Anthropological Papers of the University of Alaska* 22(1-2):1-191.
- Appelt, M., J. Berglund and H. C. Gulløv (editors)  
2000 *Identities and Cultural Contacts in the Arctic. Proceedings from a Conference at the Danish National Museum, Copenhagen, November 30 to December 2, 1999*. The Danish National Museum and Danish Polar Center, Copenhagen.
- Appelt, M., H. C. Gulløv and H. Kapel  
1998 The Gateway to Greenland. Report on the Field Season 1996. In *Man, Culture and Environment in Ancient Greenland*, edited by J. Arneborg and H. C. Gulløv. Danish National Museum and Danish Polar Center, Copenhagen.
- Arundale, W.  
1981 Radiocarbon Dating in the Eastern Arctic: A Flexible Approach. *American Antiquity* 46:244-271.
- Brown, T. A., D. E. Nelson, J. S. Vogel and J. R. Southon  
1988 Improved Collagen Extraction by Modified Longin Method. *Radiocarbon* 30(2):171-177.
- Burch, E. S., Jr.  
1980 Traditional Eskimo Societies in Northwest Alaska. In *Alaska Native Culture and History*, edited by Y. Kotani and W. Workman, pp. 253-304. Senri Ethnological Studies, Vol. 4. National Museum of Ethnology, Osaka.
- 1998 *The Iñupiaq Eskimo Nations of Northwest Alaska*. University of Alaska Press, Fairbanks.
- Clark, D. W. and A. M. Clark  
1993 *Batza Téna: Trail to Obsidian*. Mercury Series, Archaeological Survey of Canada, Paper 147. Canadian Museum of Civilization, Hull.
- Collins, H. B.  
1953 Radiocarbon Dating in the Arctic. *American Antiquity* 18(3):197-203.
- 1954 The Position of Ipiutak in Eskimo Culture—Reply. *American Antiquity* 20(1):79-84.
- Cox, S. L.  
1978 Palaeo-Eskimo Occupations of the North Labrador Coast. *Arctic Anthropology* 15(2):96-118.
- 1988 Pre-Dorset Occupations of Okak Bay, Labrador. *The Northern Raven* 7(3):4.
- 2003 Palaeoeskimo Structures in the Okak Region of Labrador. *Études/Inuit/Studies* 27(1-2):417-437.
- Dumond, D. E. and D. G. Griffin  
2002 Measurements of the Marine Reservoir Effect on Radiocarbon Ages in the Eastern Bering Sea. *Arctic* 55(1):77-86.

- Dyke, A. S., R. N. McNeely and J. Hooper  
 1996 Marine Reservoir Corrections for Bowhead Whale Radiocarbon Age Determinations. *Canadian Journal of Earth Sciences* 33:1628-1637.
- Elling, H.  
 1996 The Independence I and Old Nuulliit Cultures in Relation to the Saqqaq Culture. In *The Paleo-Eskimo Cultures of Greenland*, edited by B. Grønnow, pp. 191-198. Danish Polar Center, Copenhagen.
- Giddings, J. L.  
 1949 Early Flint Horizons on the North Bering Sea Coast. *Journal of the Washington Academy of Sciences* 39(3):85-90.  
 1951 The Denbigh Flint Complex. *American Antiquity* 16(3):193-202.  
 1955 The Denbigh Flint Complex Is Not Yet Dated. *American Antiquity* 20(4):375-376.  
 1956 A Flint Site in Northernmost Manitoba. *American Antiquity* 11(3):255-268.  
 1964 *The Archaeology of Cape Denbigh*. Brown University Press, Providence.
- Giddings, J. L. and D. D. Anderson  
 1986 *Beach Ridge Archeology of Cape Krusenstern*. National Park Service, Washington, D.C.
- Grønnow, B.  
 1988 Prehistory in Permafrost: Investigations at the Saqqaq Site, Qeqertasussuk, Disco Bay, West Greenland. *Journal of Danish Archaeology* 7:24-39.  
 1994 Qeqertasussuk - The Archaeology of a Frozen Saqqaq Site in Disko Bugt, West Greenland. In *Threads of Arctic Prehistory: Papers in Honour of William E. Taylor, Jr.*, edited by D. Morrison and J.-L. Pilon, pp. 197-238. Mercury Series, Archaeological Survey of Canada, Paper 149. Canadian Museum of Civilization, Hull.  
 1996 Driftwood and Saqqaq Culture Woodworking in West Greenland. In *Cultural and Social Research in Greenland 95/96: Essays in Honour of Robert Petersen*, pp. 73-89. Ilisimatusarfik / Atuakkiorfik, Nuuk, Greenland.
- Grønnow, B. and J. Pind (editors)  
 1996 *The Paleo-Eskimo Cultures of Greenland*. Danish Polar Center, Copenhagen.
- Harp, E., Jr.  
 1958 Prehistory in the Dismal Lake area, N.W.T., Canada. *Arctic* 11(4):219-249.
- Harritt, R. K.  
 1994 *Eskimo Prehistory on the Seward Peninsula, Alaska*. U.S. Department of the Interior, National Park Service, Anchorage.
- Hayes, M. G., J. B. Coltrain and D. H. O'Rourke  
 2003 Mitochondrial DNA Analyses of Dorset, Thule, Sadlermiut, and Aleut Skeletal Samples from the Prehistoric North American Arctic. In *Mummies in a New Millennium*, edited by N. Lynnerup, C. Andreasen and J. Berglund, pp. 125-128. Greenland National Museum and Archives and Danish Polar Center, Copenhagen.

- 2005 Molecular Archaeology of the Dorset, Thule, and Sadlermiut: Ancestor-Descendant Relationships in Eastern North American Arctic Prehistory. In *Contributions to the Study of the Dorset Palaeo-Eskimos*, edited by P. D. Sutherland, pp. 11-32. Archaeological Survey of Canada, Mercury Series, Vol. 167. Canadian Museum of Civilization, Hull.
- Helmer, J. W.  
 1986 A Face From the Past: An Early Pre-Dorset Ivory Maskette from Devon Island, N.W.T. *Études/Inuit/Studies* 10(1-2):179-202.
- 1994a The Paleo-Eskimo Prehistory of the North Devon Lowlands. *Arctic* 44(4):301-317.
- 1994b Resurrecting the Spirit(s) of Taylor's "Carlsberg Culture": Cultural Traditions and Cultural Horizons in Eastern Arctic Prehistory. In *Threads of Arctic Prehistory: Papers in Honour of William E. Taylor, Jr.*, edited by D. Morrison and J.-L. Pilon, pp. 15-34. Mercury Series, Archaeological Survey of Canada, Paper 149. Canadian Museum of Civilization, Hull.
- Hopkins, D. M. and J. L. Giddings  
 1953 Geological Background of the Iyatayet Archeological Site, Cape Denbigh, Alaska. *Smithsonian Miscellaneous Collections* 121(11).
- Irving, W. N.  
 1953 Evidence of Early Tundra Cultures in Northern Alaska. *Anthropological Papers of the University of Alaska* 1(2):55-85.
- 1957 An Archaeological Survey of the Susitna Valley. *Anthropological Papers of the University of Alaska* 6(1):37-52.
- 1962 1961 Field Work in the Western Brooks Range, Alaska: Preliminary Report. *Arctic Anthropology* 1(1): 76-83.
- 1964 *Punyik Point and the Arctic Small Tool Tradition*. Ph.D. dissertation, Department of Anthropology, University of Wisconsin, Madison.
- 1969/ The Arctic Small Tool Tradition. In *Eighth International Conference of Anthropological and*  
 1970 *Ethnological Sciences*, Vol. 3, pp. 340-342. Science Council of Japan, Tokyo.
- Julig, P. and W. Hurley  
 1988 Obituary: William Nathaniel Irving (1927-1987). *Canadian Journal of Archaeology* 12:210-217.
- Knuth, E.  
 1954 The Paleo-Eskimo Culture of Northeast Greenland Elucidated by Three New Sites. *American Antiquity* 19(4):367-381.
- Larsen, H. and J. Meldgaard  
 1958 *Paleo-Eskimo Cultures in Disko Bugt, West Greenland*. Meddelelser om Grønland 161:2.
- LeBlanc, S. and M. Nagy  
 2003 Introduction to the Special Volume on Paleoeskimo Architecture. *Études/Inuit/Studies* 27(1-2):11-12.
- Maschner, H. D. G. and J. W. Jordan  
 2001 The Russell Creek Manifestation of the Arctic Small Tool Tradition on the Western Alaska Peninsula. In *Archaeology in the Aleut Zone of Alaska: Some Recent Research*, edited by D. E. Dumond, pp. 151-171. *University of Oregon Anthropological Papers* No. 58.



Mason, O. K. and S. C. Gerlach

1995 The Archaeological Imagination: Zooarchaeological Data, the Origins of Whaling in the Western Arctic, and “Old Whaling” and Choris Cultures. In *Hunting the Largest Animals*, edited by A. P. McCartney, pp. 1-32. Canadian Circumpolar Institute, Edmonton.

Maxwell, M. S.

1973 *Archaeology of the Lake Harbour District, Baffin Island*. Archaeological Survey of Canada Mercury Series 6. National Museum of Man, Ottawa.

1976 *Eastern Arctic Prehistory: Paleoeskimo Problems*. Memoirs of the Society for American Archaeology 31. Society for American Archaeology, Washington, D.C.

1985 *Prehistory of the Eastern Arctic*. Academic Press, New York.

McGhee, R.

1976 Paleoeskimo Occupations of Central and High Arctic Canada. In *Eastern Arctic Prehistory: Paleoeskimo Problems*, edited by M. Maxwell, pp. 15-39. Memoirs of the Society for American Archaeology 31, Washington, D.C.

1979 *The Palaeoeskimo Occupations at Port Refuge, High Arctic Canada*. Archaeological Survey of Canada Paper No. 92. National Museums of Canada, Ottawa.

McGhee, R. and J. Tuck

1976 Un-dating the Canadian Arctic. In *Eastern Arctic Prehistory: Paleoeskimo Problems*, edited by M. S. Maxwell, pp. 6-14. Memoirs of the Society for American Archaeology 31, Washington D.C.

Meldgaard, J.

1952 A Paleo-Eskimo Culture in West Greenland. *American Antiquity* 17(3):222-230.

Møbjerg, T.

1999 New Adaptive Strategies in the Saqqaq Culture of Greenland, c. 1600–1400 BC. *World Archaeology* 30(3):452-465.

Morrison, D. and J.-L. Pilon (editors)

1994 *Threads of Arctic Prehistory: Papers in Honour of William E. Taylor, Jr.* Mercury Series, Archaeological Survey of Canada Paper, 149. Canadian Museum of Civilization, Hull.

Nagy, M. I.

2000 *Paleoeskimo Cultural Transition: A Case Study from Ivujivik, Eastern Arctic*. Nunavik Archaeology Monograph Series No. 1. Avataq Cultural Institute, Lachine, Québec.

O’Rourke, D. H.

2005 Biomolecular Archaeology: Summary and Speculations. In *Biomolecular Archaeology*, edited by D. M. Reed, pp. 208-219. Occasional Paper No. 32. Center for Archaeological Investigations, Carbondale.

Odess, D.

2002 Demography and Interaction: A Critical Appraisal of the Core Area Concept in Paleoeskimo Archaeology. In *Honoring Our Elders: A History of Eastern Arctic Archaeology*, edited by W. Fitzhugh, S. Loring and D. Odess, pp. 113-119. Contributions to Circumpolar Anthropology 2. Smithsonian Institution Arctic Studies Center, Washington, D.C.

2003 An Early Arctic Small Tool Tradition Structure from Northwestern Alaska. *Études/Inuit/Studies* 27(1-2): 13-28.

- 2005 The Arctic Small Tool Tradition. In *Encyclopedia of the Arctic*, edited by M. Nuttall, pp. 146-147. Routledge, New York.
- Powers, W. R. and R. K. Jordan  
1990 Human Biogeography and Climate Change in Siberia and Arctic North America in the Fourth and Fifth Millennia B.P. *Philosophical Transactions of the Royal Society of London Series A* (330):665-670.
- Reimer, P. J., M. G. L. Baillie, E. Bard, A. Bayliss, J. W. Beck, C. Bertrand, P. G. Blackwell, C. E. Buck, G. Burr, K. B. Cutler, P. E. Damon, R. L. Edwards, R. G. Fairbanks, M. Friedrich, T. P. Guilderson, K. A. Hughen, B. Kromer, F. G. McCormac, S. Manning, C. B. Ramsey, R. W. Reimer, S. Remmele, J. R. Southon, M. Stuiver, S. Talamo, F. W. Taylor, J. v. d. Plicht and C. E. Weyhenmeyer  
2004 IntCal04 Terrestrial Radiocarbon Age Calibration, 26–0 ka BP. *Radiocarbon* 46:1029-1058.
- Schledermann, P.  
1990 *Crossroads to Greenland*. Komatik Series 2. Arctic Institute of North America, Calgary.  
1996 *Voices in Stone*. Komatik Series 5. Arctic Institute of North America, Calgary.
- Stuiver, M., P. J. Reimer and T. F. Braziunas  
1998 High-precision Radiocarbon Age Calibration for Terrestrial and Marine Samples. *Radiocarbon* 40(3): 1127-1151.
- Willey, G. R. and P. Phillips  
1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.