

ARCTIC INSTITUTE OF NORTH AMERICA

TECHNICAL PAPER NO. 11

**PREHISTORIC CULTURAL RELATIONS BETWEEN THE
ARCTIC AND TEMPERATE ZONES OF NORTH AMERICA**

Edited by

JOHN M. CAMPBELL

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INTRODUCTION

This volume originated in a symposium that had, as its two principal aims, a review of the results of the most recent archaeological field studies in northern North America, and a further consideration of early cultural relationships between the northernmost reaches and the temperate areas of this continent. Organized by Dr. J. L. Giddings, and held under the chairmanship of Dr. Diamond Jenness, at the 25th Annual Meeting of the Society for American Archaeology, at Yale University, the symposium consisted of two parts. The first contained prepared papers that described and interpreted recent investigations at specific sites in northern or temperate regions. Next, a panel of discussants assumed the task of interpreting prehistoric cultural relationships across large geographical areas, basing their summaries on the previously delivered papers.

Following the meeting, and after several of the papers had been considerably revised by their authors, copies were sent to the discussants, who then set down their comments as they now appear. Meanwhile, I invited an extra paper from one of the symposium participants, and also papers from three anthropologists who had not participated, but whose present research objectives are closely allied with the aims of the symposium. Those additional contributions are included here. Thus, along the way a considerable metamorphosis has occurred. In putting together the table of contents I have preserved the basic two-part structure of the symposium, and at the same time have arranged the papers more precisely according to geography. Although some of the papers, especially those of the discussants, cover large areas, both Parts 1 and 2 treat successive regions of northern North America from the North Pacific coast, north, east, and south, to New England.

During the past decade our knowledge of arctic and subarctic prehistory has increased in geometric proportions to what was known before. This does not mean that the new generation of northern archaeologists is blessed with greater zeal, skill, or insight than the old. It is more nearly a reflection of modern communication, transportation, and logistics. There have never been many northern prehistorians, and there are not many now, but because of these factors, together with a most fortunate increase in available funds, each season we are getting out of the ground an abundance and diversity of cultural remains seldom matched in several seasons, even as recently as fifteen years ago.

In view of the much more extensive body of data now available, I think the continuing concern with theory and procedure, as expressed in many of the papers here, is of particular value. This volume thus shows something of the capacity of present-day northern archaeology. It also gives promise of what the far northern regions will some day reveal about culture history, if not the world over, at least the world around.

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PART I

WEST COAST CROSSTIES WITH ALASKA

Charles E. Borden

It is common knowledge that numerous crossties exist between the Northwest Coast and Alaska. These links encompass not only many individual traits and complexes of minor importance, but also culture patterns of basic socio-economic significance. Some of the correspondences are so extensive and of such esoteric nature as to suggest sustained early contacts between certain groups of Northwest Coast Indians and Eskimos (de Laguna, 1934, p. 218; Collins, 1937, pp. 291-2; 1940, pp. 576-7; Lantis, 1938; Heizer, 1943, p. 448; 1956, pp. 10, 11; Borden, 1950, pp. 22-6; 1951, pp. 37-40; 1954, p. 26; Drucker, 1955).

For some of us who have grappled with the problems of cultural development in northwestern North America it has been almost axiomatic in the past to attribute any aspect concerned with the efficient exploiting of maritime resources to Eskimo influence. Thus, the present writer was persuaded to assign the loaded term "Eskimoid" to the Locarno Beach Phase of the Fraser delta region because the sites in question included such items as toggling harpoons, harpoon foreshafts, ulus, men's knives and projectile points of ground slate, labrets, and other elements often regarded as typically Eskimo (Pls. 2-5; Borden, 1950, pp. 15-17, 20; 1951, pp. 45-7; 1954, p. 26). On the other hand, the suggestion that certain types of barbed antler harpoons and fixed points characteristic of the Marpole Phase had been introduced from the adjacent interior (Pl. 2; Borden, 1951, p. 45; 1954, pp. 26-31) was dismissed as nothing more than "carrying coals to Newcastle". The occurrence of similar devices in Aleut and Pacific Eskimo centers was considered sufficient to settle the question of origin (Osborne *et al.*, 1956, pp. 119, 121).

Drucker, one of the most astute students of Northwest Coast culture, has rendered a service by giving this tendency to attribute existing parallels to Eskimo influence its most extreme expression in an hypothesis which lends itself to archaeological testing. He proposes: "that the distinctive basic patterns of the Northwest Coast culture, from Yakutat Bay to northwest California were derived from the same subarctic fishing-and-sea-hunting base of the coasts of Bering Sea and southwest Alaska that gave rise to the various Eskimo and Aleut cultures." Eskimo-Aleut, according to Drucker, did not only provide the economic basis for the subsequent development of the various regional variants of Northwest Coast culture, but were also the donors of a long list of traits and complexes. Recalling the well-known indications of Asiatic influence on the

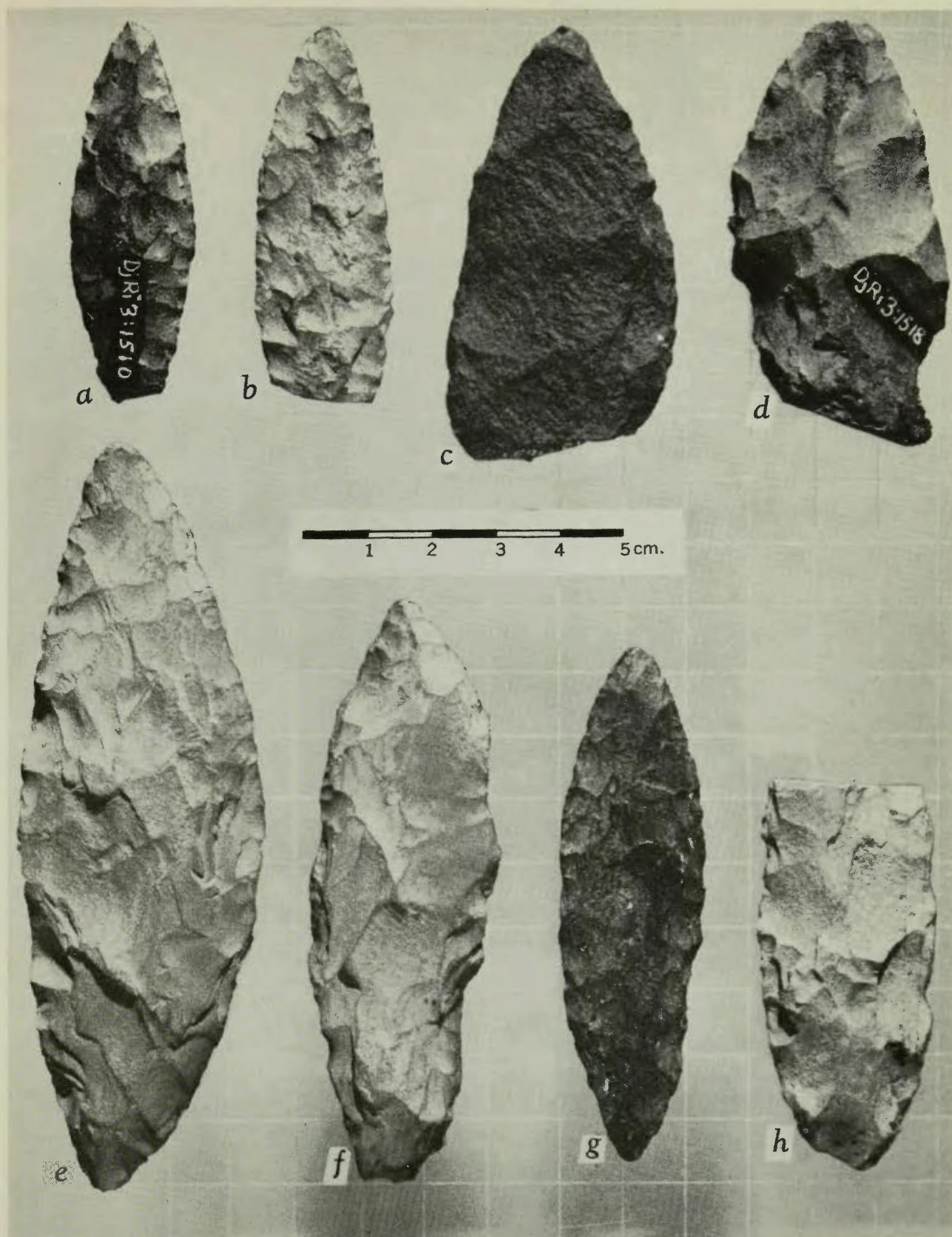
Northwest Coast, Drucker asserts, moreover, that "any northeast Asiatic concepts, whether of major or minor significance in Northwest Coast culture growth, must have been transmitted to the Northwest Coast peoples by Eskimo-Aleut. . . . These Asiatic influences", he emphasizes, "could not have been transmitted prior to the development of Eskimo-Aleut Culture in southwest Alaska and the Bering Sea region" (Drucker, 1955, pp. 61, 64). Those who embraced this thesis with all too great alacrity should have taken note of Drucker's (1955, p. 59) own awareness that his interpretation was based mainly on recent ethnographic distributions and that it lacked the controls defined by archaeological sequences and relationships.

Meanwhile, new data and C-14 dates have become available which open hitherto unsuspected vistas of cultural development in northwestern North America. In 1959 the University of British Columbia started systematic work at DjRi 3, a deeply stratified site in the Fraser Canyon, where preliminary explorations had produced evidence of great antiquity (Borden, 1960).¹ The excavations, which were carried down to a depth of 32 feet, revealed a sequence of five occupations. Beneath cultural remains of the millennia immediately following and preceding the beginning of the Christian era and gravels containing volcanic ash of the Glacier Peak eruption of 4800 B.C. is a cultural deposit (Drs. J. R. Mackay, W. H. Mathews, and K. C. McTaggart, U.B.C., and Dr. E. Swanson, Idaho State College Museum, personal communications) with a C-14 date of 5391 B.C. Massive gravels in turn separate this stratum from an earlier occupation which was dated at 6193 B.C.² Five feet below this level, evidence of a still earlier occupation was found. This earliest horizon has not yet been dated, but its antiquity probably exceeds 9,000 years, an age which would place it in the eighth millennium B.C. The stone industry from the early levels includes heavy cobble choppers, numerous scrapers of different types, knives, including crescentic forms, and leaf-shaped points, some of which have a single shoulder or inset, rather high on one edge, reminiscent of Sandia forms (Pl. 1). These too may have been knives rather than projectile points. The earliest two levels also yielded charred pits of a wild cherry (*Prunus demissa*). This edible fruit evidently was gathered in considerable quantities and consumed at the site. Unfortunately, soil conditions are such that no artifacts of organic materials nor any faunal remains survive. It is, therefore, not immediately apparent what brought the Indians to this site. For the present, we must rely on indirect evidence. Opportunities for hunting, particularly of large animals would have been poor, but to this day, this turbulent stretch of the river is famed among Indians as the best place for catching salmon (Duff, 1952, p. 62). A hint that it was also anadromous fishes which attracted Indians to this locality in remote periods is provided by the pits of the wild cherry. This fruit matures in the months of August and September, the very time when the biggest salmon runs ascend the river.

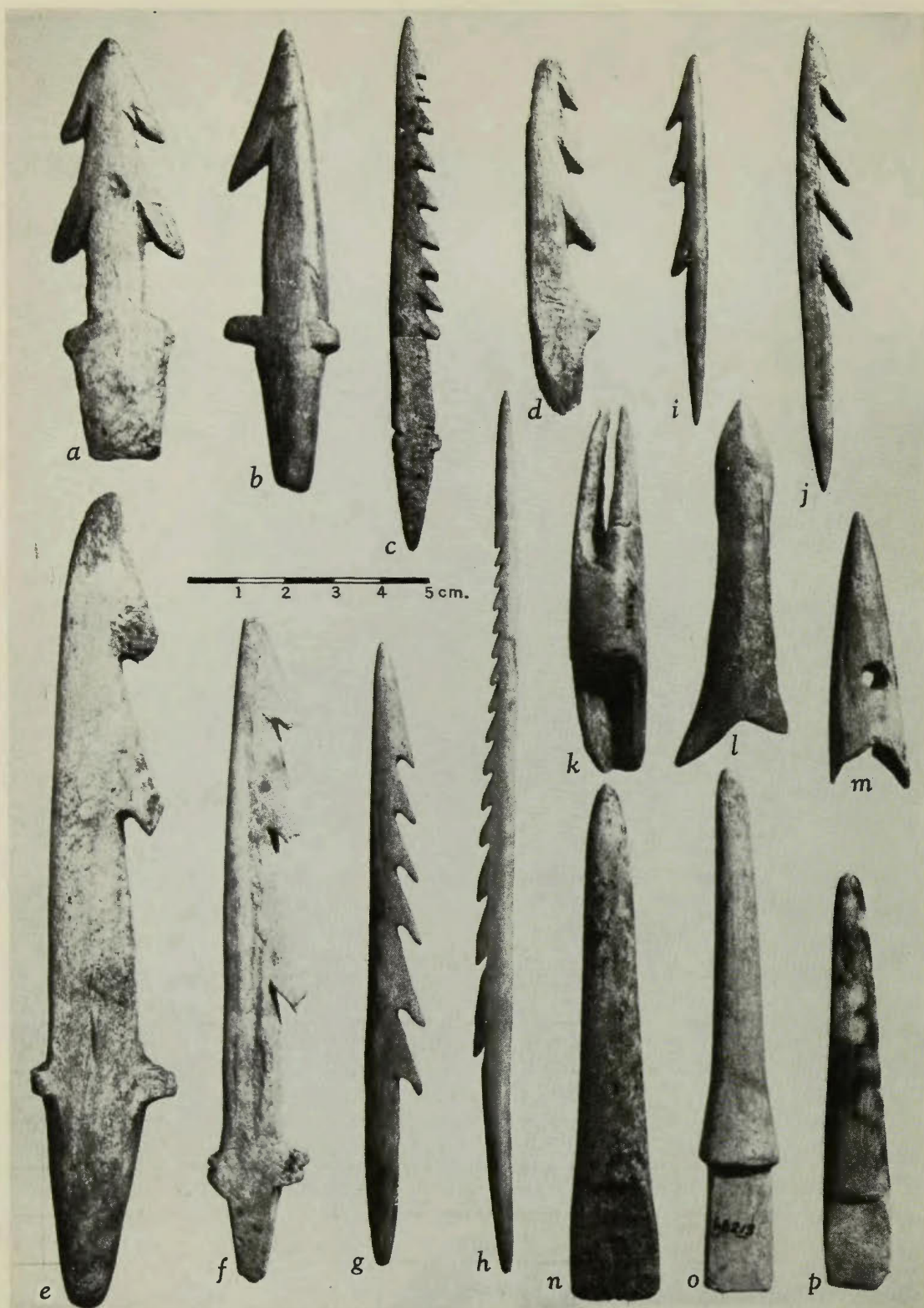
Among the stone detritus of the level dated at 6193 B.C. was a chip of transparent obsidian. While opaque and translucent obsidian occurs in British

¹The National Museum of Canada has joined the University of British Columbia in sponsoring this project. The work is receiving additional support from Dr. H. R. MacMillan and the Leon and Thea Koerner Foundation.

²All C-14 dates from British Columbia given in this paper were made by Dr. K. J. McCallum and staff, Department of Chemistry, University of Saskatchewan.



Pl. 1. Chipped projectile points and knives. Site DjRi 3, Fraser Canyon, British Columbia. *a-d*, from occupational horizon, dated at 5391 B.C.; *e-h*, from level dated at 6193 B.C.



Pl. 2. Antler artifacts from sites in Fraser delta region. *a-f*, barbed harpoon heads; *g-j*, barbed fixed points; *k-m*, toggling harpoon heads, *l* with ground bone point in slot; *n-p*, foreshafts for toggling harpoons; *a-k*, Marpole Phase; *l-p*, Locarno Beach Phase.

Columbia, the nearest natural occurrence of such clear volcanic glass is in Oregon. Very likely, therefore, the early occupants of the Fraser Canyon had connections in that direction. And it is to the Columbia River that we now must turn our attention, where Cressman's important discoveries at the Dalles provide the most significant evidence for an early riverine adaptation in the Northwest (Cressman *et al.*, 1960). From cultural levels which, according to C-14 analysis, are contemporary with, and in part earlier than, our early levels on the Fraser, Cressman's students recovered more than 200,000 salmon vertebrae, leaving no doubt that these fish were the major food staple of the local Indian inhabitants. Of more than passing interest is the occasional presence of seal bones. These sea mammals evidently were taken as they followed the salmon runs upriver, an interesting New World parallel to similar practices of inland-dwelling Upper Paleolithic groups of western Europe (Clark, 1952, pp. 72-3). While the hunting of land mammals seems to have been unimportant, the early Columbia River Indians killed great numbers of birds with bolas. Associated with the food remains is a flourishing elk antler industry. Antler and bone were sectioned and worked into artifacts with true burins of several types. Interestingly, the techniques employed are virtually identical to those of the nearly contemporary site at Starr Carr, England (Clark *et al.*, 1954, chap. 5), emphasizing the early distribution around the world of such manufacturing methods. Among the devices produced of antler at the Dalles were the spurs for throwing boards and small unilaterally barbed points, identified by Cressman as harpoons. Obviously, these Indians were well-equipped for exploiting riverine resources.

Noting that his findings are earlier by several thousand years than evidence of similar ecological adaptation elsewhere in North America, Cressman rightly suggests the possibility that on this continent such patterns were first evolved in the Pacific Northwest, and that in the following millennia they were carried into northern regions by Indians moving through the interior of Washington and British Columbia.

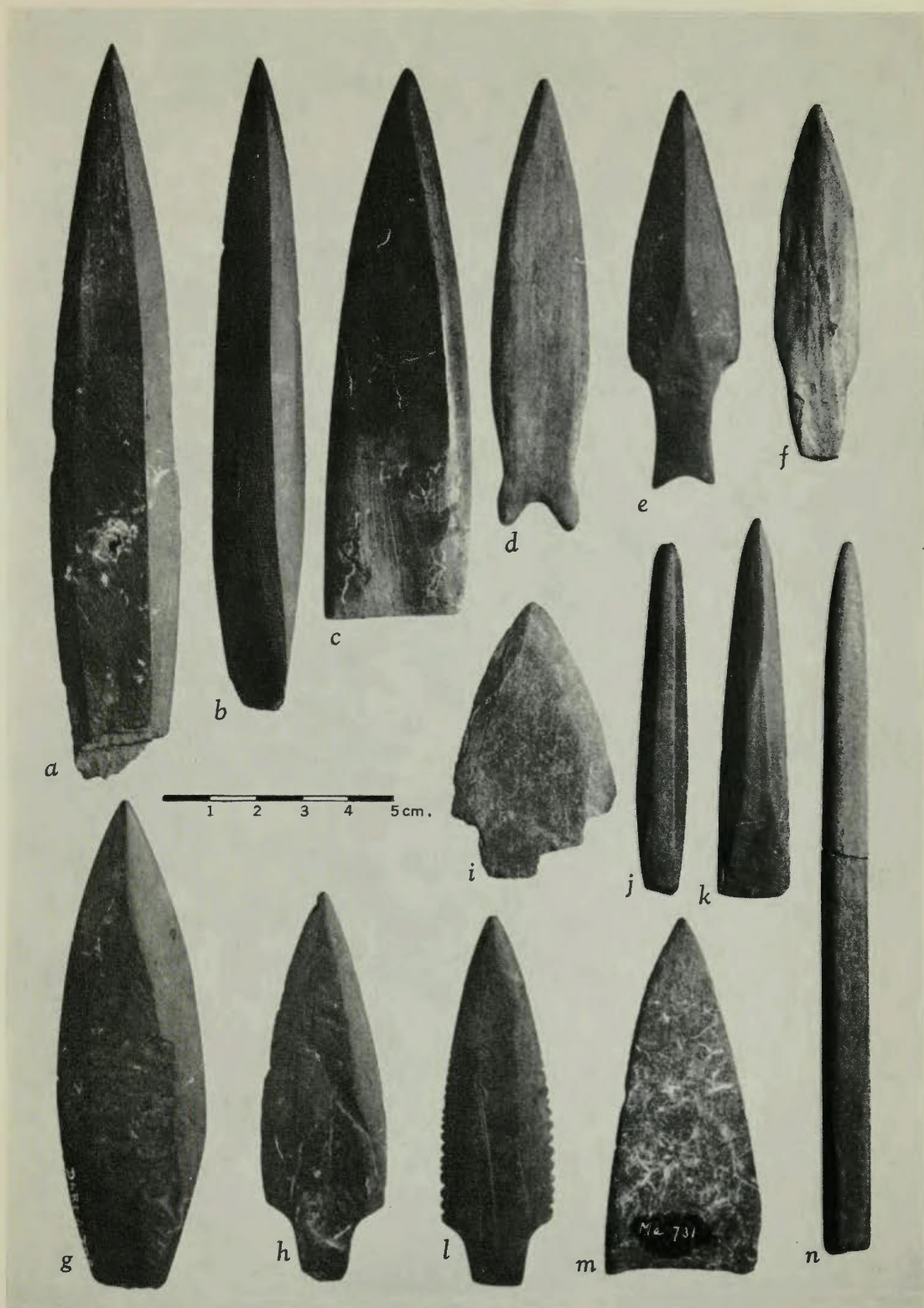
While such northward population movements of hunter-fishers very likely occurred—paralleling the northward drift of big game hunters farther to the east—we must not ignore the possibility that the potentialities inherent in the new way of life were further developed not far from where they had originated. The adaptation to riverine resources is a natural step toward successful existence at the river mouth and eventually on the sea shore. Kroeber (1939, p. 30) long ago called attention to the Gulf of Georgia region as a potentially important area for the initial stages in the development of Northwest Coast culture. Dismissing the coastal environment near the estuary of the Columbia as unfavorable, Kroeber pointed to the mouth of the Fraser as the most logical and ideal locality where the early transformation might have occurred. It is significant in this context that 8,000 to 9,000 years ago the lower valley of the Fraser was still depressed from the last and recently terminated local glaciation and that a long inlet extended from the Gulf of Georgia to the vicinity of Hope (Dr. J. E. Armstrong, Geological Survey of Canada, personal communication). Thus, the Indians who fished in the Fraser Canyon at that time were little more than twenty miles from the mouth of the river and salt water. The stage for experimenting with maritime resources was set even then. Perhaps such experiments had already begun.

A time span of some 4,000 years intervenes between the last of the early occupational horizons of the Fraser Canyon site and the sites investigated to date one hundred miles to the west near the present mouth of the river. A tremendous cultural development, of which we know as yet nothing, had taken place meanwhile (Pls. 2-6). These delta cultures of the first millennium B.C. loom up before us with the Northwest Coast culture patterns well blocked out: maritime orientation, highly developed woodworking, large villages with commodious houses along the shore, and so forth. These features are particularly apparent in the sites of the Marpole Phase, which has a series of C-14 dates ranging from 943 B.C. to A.D. 179. Although additional C-14 analyses are necessary to determine the approximate beginnings of this phase, it seems probable that its characteristic features were in existence by 1000 B.C. and possibly earlier. A cultural variant, the Locarno Beach Phase, whose main centers may have been on the Gulf Islands,¹ is so far known only from two sites on the outermost fringe of the delta region. The radiocarbon dates of 476 B.C. and 493 B.C. suggest that it was roughly contemporary with the Marpole Phase. Evidence of woodworking on a large scale—which is so prominent at the sites of the Marpole culture—is so far lacking from the Locarno Beach Phase. On the other hand, the latter seems even more strongly oriented toward the sea.

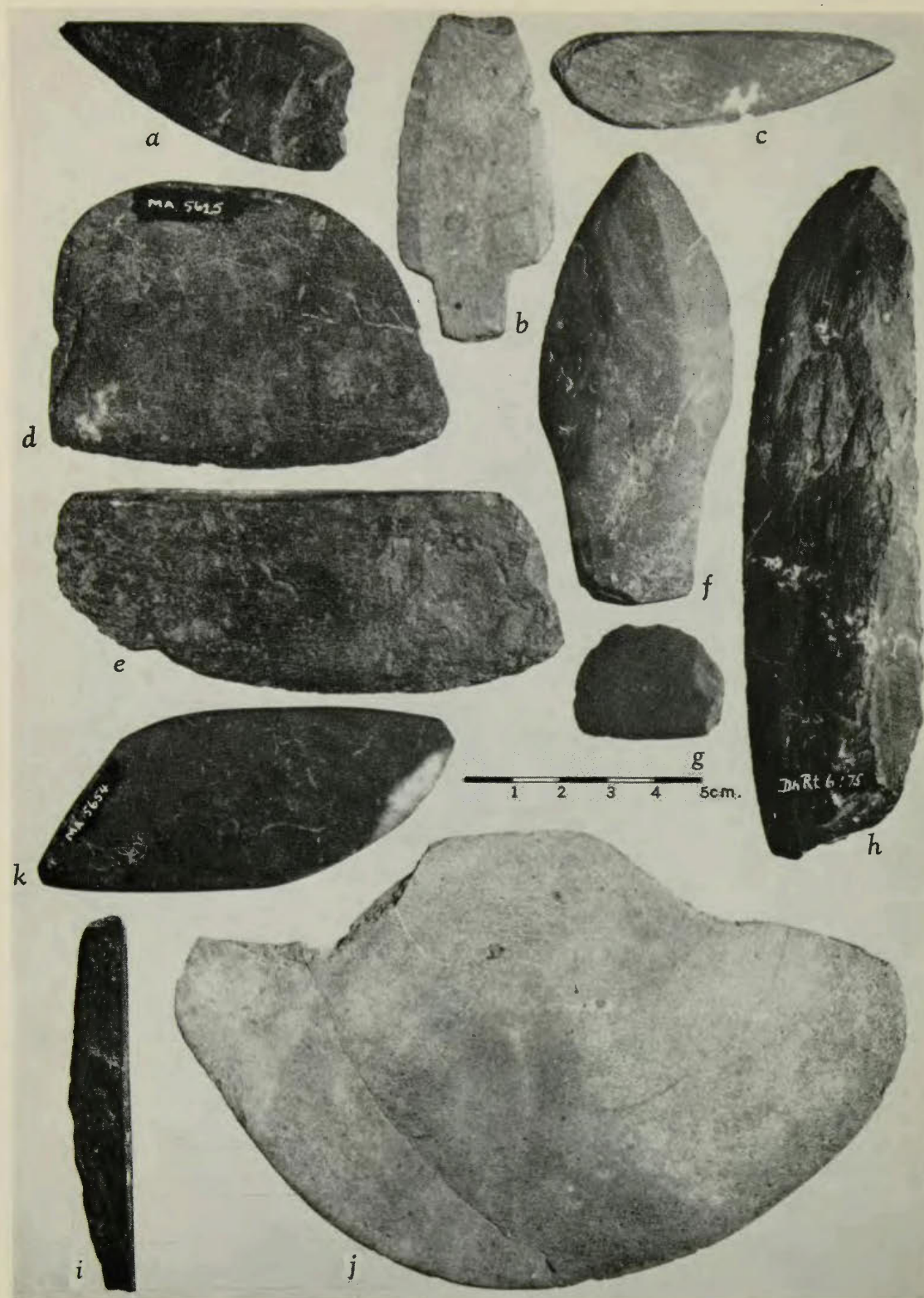
Must we assume now that these cultures came into being only after the Eskimos had laid the foundation? There is no evidence to support such an hypothesis. The culture of the Marpole Phase is firmly rooted in local tradition. Links with the ancient riverine cultures of the Columbia and the Fraser are obvious. Exploitation of the rich fish resources, which started more than 7,000 years earlier, is still the economic basis, supplemented by fowling and some hunting of land animals. But in addition shellfish is extensively eaten, and numerous harpoons (Pl. 2) as well as the bones of seal, sea lion, and porpoise, attest to the importance of sea mammal hunting. Some marine game, it is of interest to recall, was already taken in the Early Period at the Dalles. The problem concerning the origin of toggling harpoons deserves a more detailed treatment than is possible here. At any rate, there is no compelling reason to assume that Eskimos were the donors of these devices. The barbed antler harpoons and fixed points very likely were evolved from early interior prototypes. Accidents of preservation have probably obscured the importance among interior groups of barbed projectiles of organic materials in remote periods. It is noteworthy, for instance, that even the bison hunters of the Lind Coulee site in eastern Washington used barbed bone points nearly 9,000 years ago (Daugherty, 1956, pp. 253-5, Figs. 25, 3 and 26, 5). Again, certain antler wedges of the Marpole Phase, which play a prominent role in the flourishing woodworking industry of this coastal culture, are almost indistinguishable from similar artifacts of the Early Period at the Dalles. Finally, though there are many new forms, even the chipping industry of the Marpole Phase still shows marked affinities with the ancient up-river types.

Aside from indications of vigorous local growth there is striking evidence of later cultural impulses from other areas. Stone vessels, mortars, and the pestle-shaped stone hammer—so important in the woodworking of the coast—probably were developed from prototypes derived from the Great Basin-Lower Columbia region, where similar artifacts have great time depth (Cressman, 1956,

¹Name in general local use.



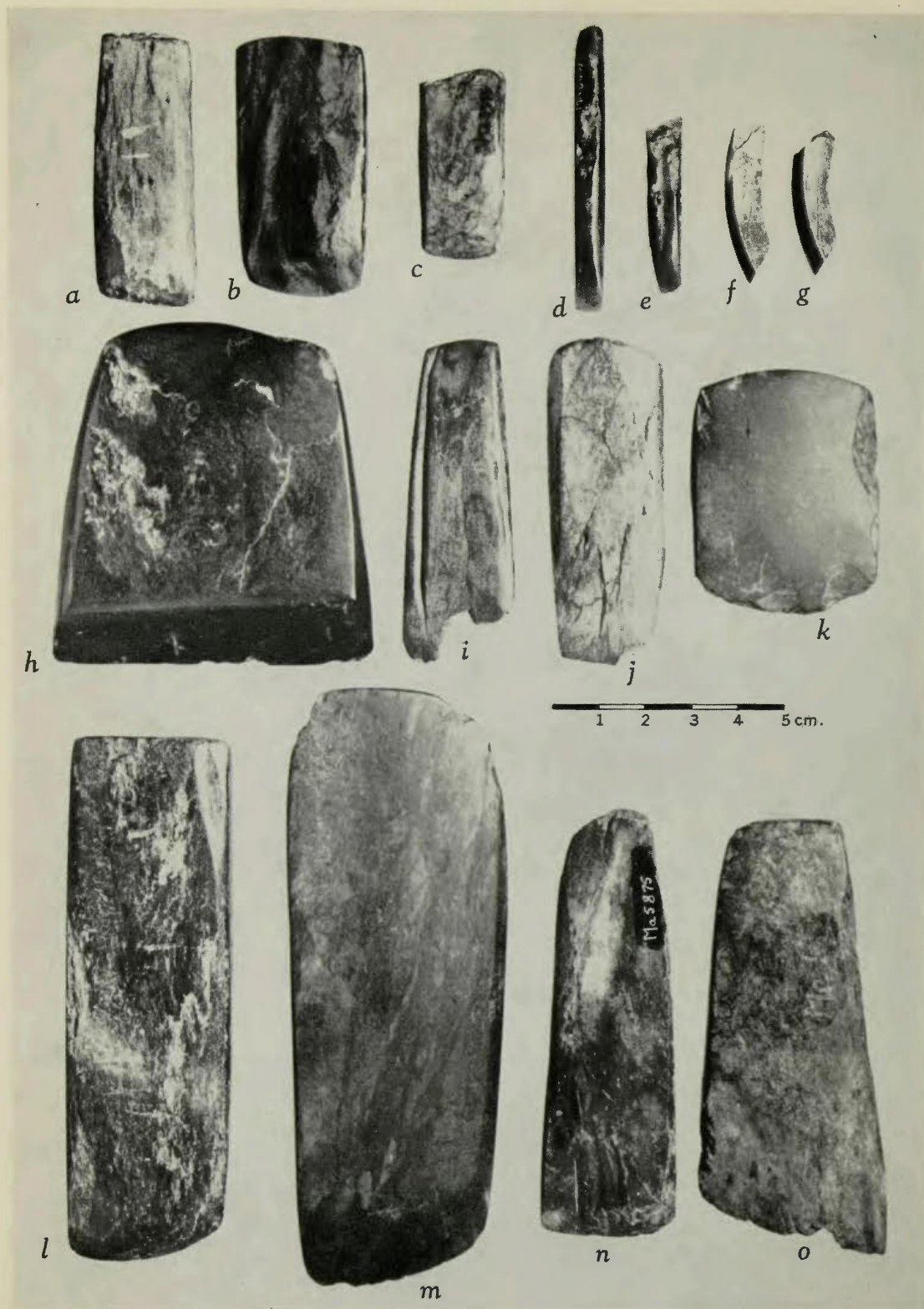
PL. 3. Ground slate points from sites in Fraser delta region. *a-h*, Locarno Beach Phase; *i-n*, Marpole Phase.



Pl. 4. Ground slate implements from sites in Fraser delta region. *a, c, h, i*, single-edge end blades for knives; *b, f*, double-edge end blades; *d, e, j*, ulus; *g*, miniature ulu (toy?); *k*, saw. *a, b, e, h, i*, Locarno Beach Phase; *c, d, f, g, j, k*, Marpole Phase.



PL. 5. Antler, bone, and stone sculpture, ornaments, and ceremonial objects from sites in Fraser delta region. *a*, pendant in form of human head; *b*, carving of great blue heron; *c*, *m*, buckles (?) in form of bird's heads; *e*, effigy of human skull; *d*, *h*, bone knives, embellished with whale tail motif; *n*, fragment of ornament with incised frogs (?); *o*, harpoon fragment with engraving of sea monster; *q*, fish effigy; *f*, *g*, bird bone whistles; *i*, carved pendant; *k*, *l*, *p*, labrets; *j*, inner flange of composite labret. *a-c*, *f*, *i*, *l-q*, Marpole Phase; *d*, *e*, *g*, *h*, *j*, *k*, Locarno Beach Phase.



Pl. 6. Woodworking and carving tools from sites in Fraser delta region. *a-e, b-o*, adze blades and narrow-bit chisels of nephrite and jadeite, except for *k*, which is of cherty slate; *f, g*, beaver incisor tools with re-sharpened cutting edge. *a-i, l-o*, Marpole Phase; *j, k*, Locarno Beach Phase.

pp. 419–20, 464; Cressman *et al.*, 1960). Though few will question the genetic relationship between the impressive sculpture of the Lower Fraser–Gulf of Georgia region and that of the Lower Columbia, we still lack sufficient chronological data to permit us to indicate the origin of this artistic activity. It may have been in the south. On the other hand, considerable antiquity for the beginnings of this art in the more northerly of the two regions is suggested by the fact that carving in stone, antler, and bone reached an early climax in the Fraser delta during the first millennium B.C. (Pl. 5). The famed art of the classic Northwest Coast is, obviously, rooted in this ancient tradition (Drucker, 1943, pp. 127–8; Borden, 1950, pp. 19, 25; Wingert, 1952, pp. 9–11; Duff, 1956a, pp. 94–115). It is likewise evident that these ancient artistic manifestations of the southern Northwest Coast are too early and too developed to have been stimulated by any known Eskimo culture. Future studies may determine whether palpable influences were exerted in the opposite direction. Some years ago, Collins (1937, p. 291) called attention to certain similarities between Old Bering Sea art and that at prehistoric sites in British Columbia and Washington. Eskimo-Aleut very likely adopted the practice of wearing lip ornaments from early Northwest Coast Indians (Borden, n.d. a). Labrets are found in Fraser delta sites of both the Marpole and the Locarno Beach phases (Pl. 5, *j, k, l, p*). It seems that ear spools were also worn in the Gulf of Georgia region during the first millennium B.C. A broken ear spool carved in white marble was recovered from the Locarno Beach site (cf. also Duff, 1956a, p. 131, Pl. 4, *B*; 1956b, p. 5, Fig. 3 F, 8). Labrets and ear spools may hint at cultural stimuli originating in Nuclear America.

But there are other traits in the Marpole Phase which can neither be derived from the south nor are they likely to have been the result of local development. Among these are ground slate implements (Pls. 3, 4), stone saws (Pl. 4, *k*), neatly cut and polished nephrite adzes (Pl. 6, *a–c, b–j, l–o*), bone whistles (Pl. 5, *f, g*), beaver tooth knives or gouges (Pl. 6, *f, g*), and fish effigies (Pl. 5, *q*). Except for the last two, these elements are present also in the Locarno Beach Phase. Could Eskimos have been the donors of this cluster of elements? Since ulus, men's knives, harpoon blades, and the like of ground slate are commonly regarded as "typical" Eskimo artifacts, it seems appropriate to review briefly the evidence concerning the slate industry. A more detailed study is in preparation, Borden (n.d. b).

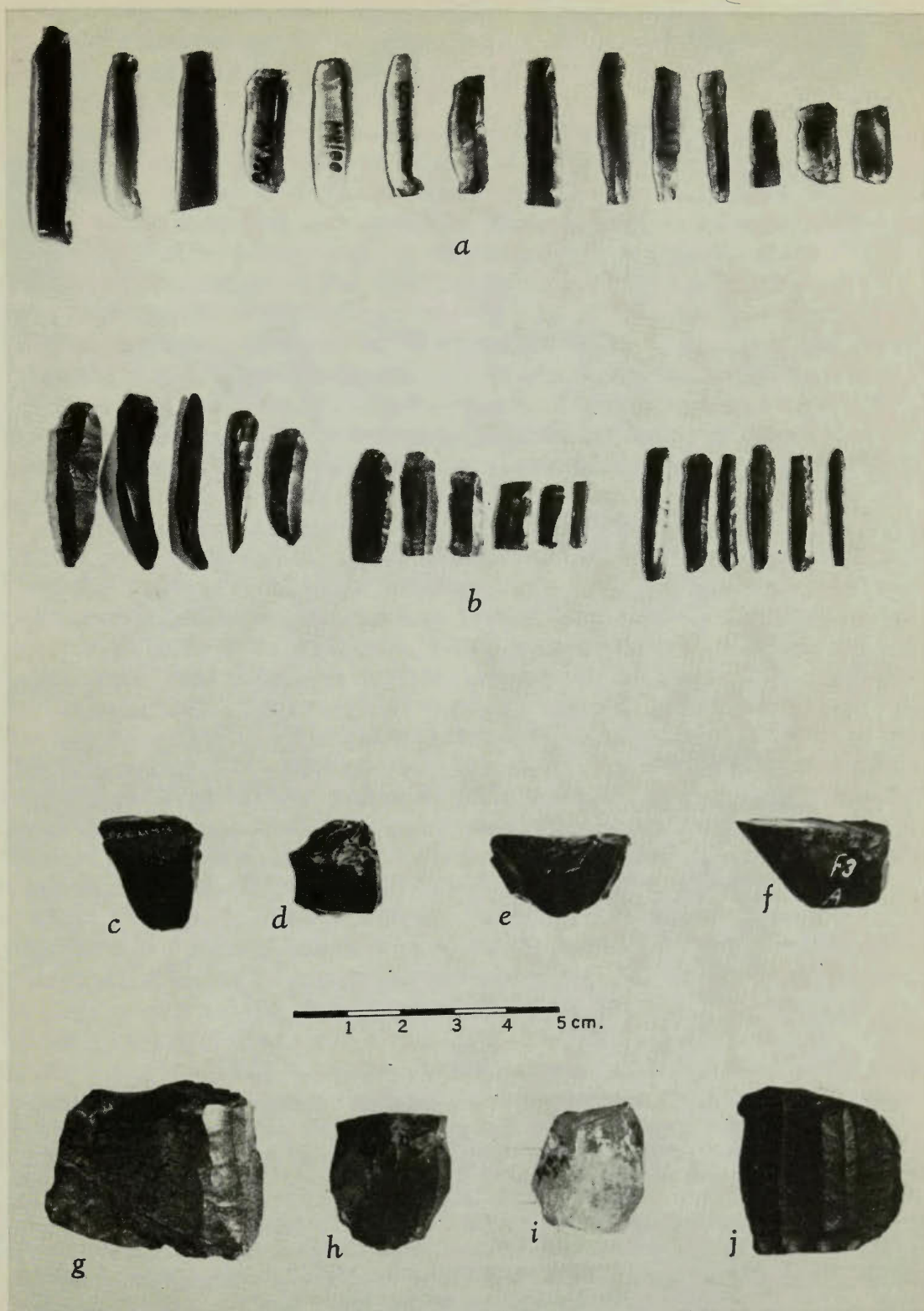
Ground slates had a tremendous vogue in the Lower Fraser–Gulf of Georgia region in the first millennium B.C. Just how important a part they played in the economic life of these people may be inferred from the fact that more than 3,000 out of a total of some 8,000 artifacts recovered from the Marpole site alone were of ground slate. Relatively, they were even more important in the Locarno Beach Phase. While chipped artifacts are still fairly common at Marpole, the flourishing ground slate industry in Whalen I and at Locarno Beach had reduced chipping to an insignificant role. Among the ground slates at the latter site are a wide variety of implements: typical ulus of various outlines, single-edged end blades, double-edged knives, saws, and numerous projectile points of different form and size, but especially large dart heads, ground to an hexagonal cross-section (Pl. 3, *a–b*; Pl. 4, *a–c, b, i*). Along with three types of toggling harpoons, the large slate projectiles appear to have been used in sea mammal hunting. A considerable number of centuries must be allowed

from the time of introduction of this slate industry to the middle of the first millennium B.C., when it had gained such dominance. Since, moreover, the C-14 samples which yielded the dates of 476 B.C. for Locarno Beach and 493 B.C. for Whalen I originated well above the bottom of their respective deposits, we may reasonably assume that the beginnings of the industry in the Gulf of Georgia extend well back into the second millennium B.C.

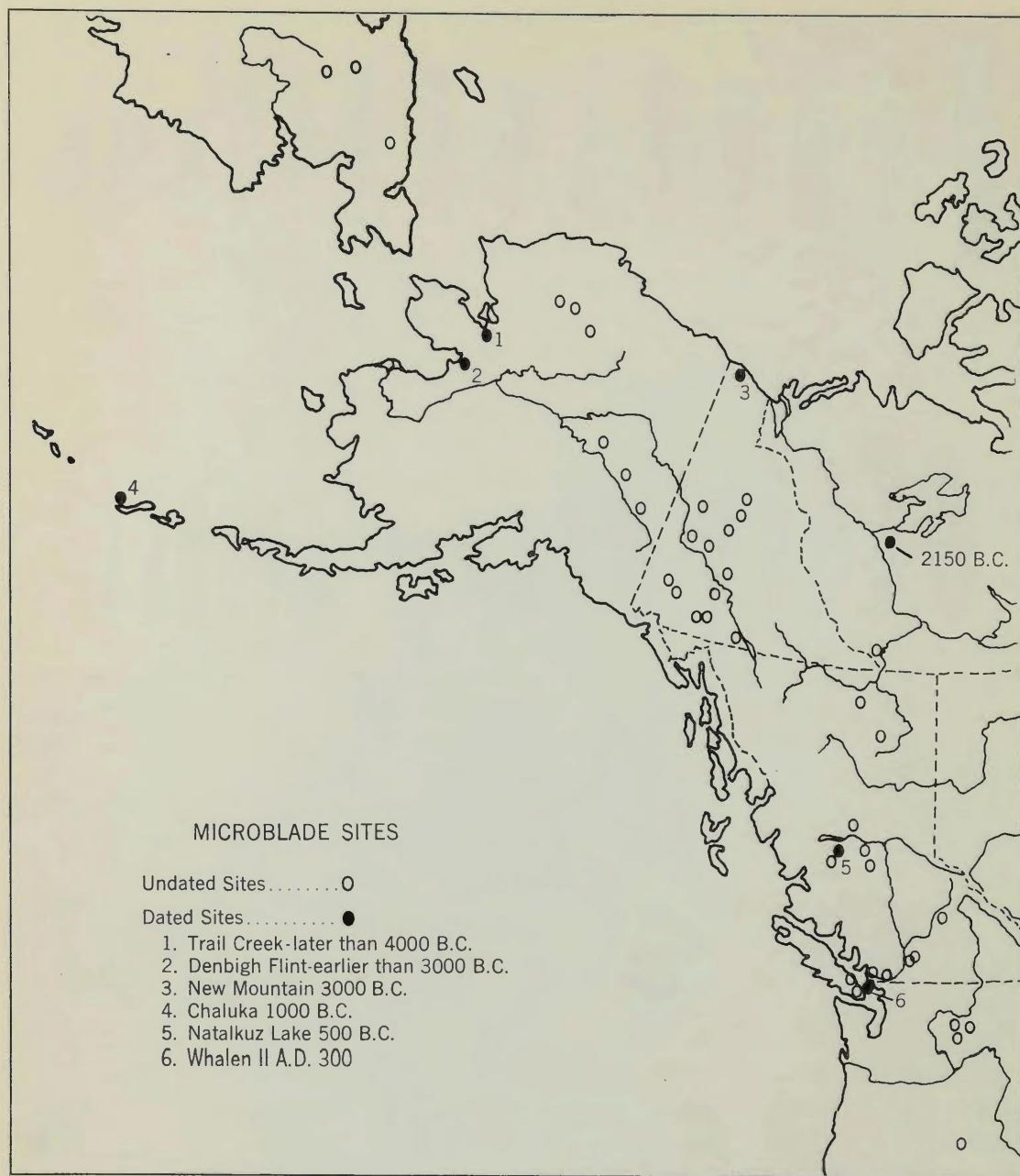
The ground slates of the eastern Archaic, as Ritchie (1951a) has demonstrated, are far too early to have been received from Eskimos. What is the archaeological evidence from Alaska? Let us begin with the Eskimo region nearest the Northwest Coast. At Cook Inlet, in the deposits of the Kachemak Bay I period, dated at 748 B.C., de Laguna found five ground slate artifacts in an assemblage otherwise dominated by chipped implements (Rainey and Ralph, 1959, p. 371; de Laguna, 1934, p. 69). Artifacts of rubbed slate, evidently, were just coming in. Farther north, a few fragments of roughly ground or scratched slate blades in the Choris assemblage, dated 677 and 688 B.C., and very similar to isolated specimens in the Norton culture (Giddings, 1957, p. 126; Rainey and Ralph, 1959, p. 370) suggest that slate grinding was spreading to Eskimos inhabiting the Seward Peninsula area in the seventh century B.C. But many centuries were to pass before slate grinding really took hold. Artifacts of ground slate are not present in Paleo-Aleut sites either before or after the beginning of the Christian era (Laughlin and Marsh, 1951, p. 82). Also the Ipiutak Eskimos had not adopted implements of rubbed slate at around A.D. 300 and later (Larsen and Rainey, 1948; Rainey and Ralph, 1959, p. 370). Although in the Okvik stage of the Old Bering Sea sequence slate grinding is well established, chipping is still the more important industry (Collins, 1937, p. 334). Originally dated at 300 B.C. (Collins, 1953b, p. 197), more recent analyses by means of the reportedly more reliable carbon dioxide gas counting technique on a series of eight Old Bering Sea samples, including two from Okvik levels, have produced dates ranging from the third to the seventh century A.D. (Rainey and Ralph, 1959, p. 369). At Cook Inlet again, the region nearest the Northwest Coast, ground slates begin to dominate the scene during the Kachemak Bay III period, which has a C-14 date of A.D. 589 (de Laguna, 1934, p. 69; Rainey and Ralph, 1959, p. 368). At Bering Strait this state of affairs is not reached until a few centuries later, i.e., in the Punuk period around A.D. 1000 (Collins, 1937, p. 334; Rainey and Ralph, 1959, p. 373). The last of the Eskimos to adopt ground slates seem to have been the Aleut. At Chaluka on Umnak Island, such implements appear in only the most recent Aleut strata (Laughlin, 1952, p. 32).

This review is sufficient to demonstrate that the ground slate industry which flourished in the Gulf of Georgia in the first millennium B.C. could not possibly have been derived from Eskimo culture in Alaska. On the contrary, the distribution of rubbed slate artifacts in space and time can be interpreted as indicating a diffusion of the industry from the Northwest Coast to the Eskimo.

We may pause here briefly to note the time which elapsed from the approximate date of introduction of slate grinding among Eskimo groups in Alaska to the time when artifacts of rubbed slate greatly outnumber those made by chipping. In Cook Inlet, the C-14 dates indicate an interval of some 1,350 years (Kachemak Bay I to III: 750 B.C.-A.D. 600). Farther north, near Bering Strait, it required approximately 1,700 years (Choris to Punuk; 690 B.C.-A.D. 1000).



PI. 7. Microblades and polyhedral cores from the Gulf of Georgia region and interior British Columbia. *a*, bladelets from upper horizon of Whalen Farm site (Whalen II), Fraser delta; *b*, microblades and *c*, core from Natalkuz Lake site, interior B.C.; *d*-*g*, polyhedral cores from sites in Vanderhoof area, central interior B.C.; *h*, core from Fraser Canyon, B.C.; *i*, core from Spedifore Farm, Fraser delta; *j*, core from Cadboro Bay, south end of Vancouver Island. *a*-*f*, obsidian; *g*, chert; *h*, *j*, basalt; *i*, quartz crystal.



Pl. 8. Microblade sites in northwestern North America. Present data on the distribution of microblade technology in space and time suggest that this Asiatic complex diffused to the Gulf of Georgia region of the Northwest Coast via interior routes. (Map is based on data from the following sources: Borden, 1950, 1952, fieldnotes; Butler, 1958; Carlson, n.d.; Chard, 1955a; Collins, 1953; Gallagher, 1959; Giddings, 1951, 1955, 1956; Irving, 1951; Johnson, 1946a; Krader, 1952; de Laguna, 1947; Laughlin and Marsh, 1954; MacNeish, 1959a, 1960; N. C. Nelson, 1937; Okladnikov and Nekrasov, 1959; Osborne, n.d.; Rainey, 1939, 1953; Rainey and Ralph, 1959; Solecki, 1951; Wormington, 1957; Mrs. D. Heron, Messrs. J. Sewell, T. Ainsworth, and J. Sendey, personal communications).

Though such evidence must be used with caution, these time lapses tend to support the assumption that the beginnings of the ground slate industry of the Gulf of Georgia region extend well back into the second millennium and perhaps to as early as around 2000 B.C.

The origins of the early slate industry on the southern Northwest Coast are still uncertain. For the time being, any suggestion that the slate grinding of the west was sparked by the well-known and perhaps older manifestations in the east of the continent must remain in abeyance until we have more definite indications of transcontinental connections at the proper time. A more likely possibility at present is that the slate grinding in both the east and the west was initiated by common influences from Asia. To be sure, to date, no evidence has been uncovered in support of Gjessing's (1944, pp. 21-5, Fig. 7) postulated broad belt of slate-grinding peoples who, he believed, were concentrated across the boreal areas of Eurasia and North America. Nevertheless, we cannot ignore the fact that slate grinding was once an important industry in certain parts of Asia and of sufficient antiquity to have stimulated similar practices in North America.

Few areas of Asia have been so well studied by archaeologists as the Lake Baikal-Upper Lena region, where Okladnikov (cf. bibliographies in Chard, 1958a and Tolstoy, 1958a,b) has developed a long cultural sequence. Though there is some disagreement concerning certain details and on the dating of this sequence (Chard, 1958a; Gimbutas, 1959), on the whole it has found general acceptance. The differences in interpretation do not materially affect the present argument. Implements of rubbed slate first appear in the, as yet, poorly represented Khin'skaya stage tentatively dated by Okladnikov as of the fifth millennium B.C. Among the most distinctive artifacts of the Khina complex are long, slender, parallel-sided hexagonally ground slate points—of which virtually exact duplicates occur in sites of the Marpole Phase of the Fraser delta (Pl. 3, *n*)—and some shorter leaf-shaped polished slate implements of lenticular cross-section (Okladnikov, 1950, Figs. 9, *A* and 15; Chard, 1958a, p. 7; Michael, 1958, p. 37; Tolstoy, 1958a, p. 398). Slate points are not specifically mentioned in the English summaries of Soviet research for the later Neolithic periods of the Baikal sequence, but sub-rectangular knives of ground shale or slate are typical of the Baikal from Isakovo (4000-3000 B.C.) through the Serovo (3000-2500 B.C.) and Kitoi (2500-1700 B.C.) periods (Chard, 1956, p. 407; Tolstoy, 1958a, pp. 400, 410; Michael, 1958, pp. 46-7, Fig. 23). While a rather soft slate was used in the Khin'skaya stage the Isakovo people began to use a harder cherty slate and, in the absence of suitable flint, even used this material for adze blades which were first blocked out by percussion chipping and then ground (Michael, 1958, pp. 40-2). Ground adze blades of the same material, we may note in passing, are found in the Locarno Beach Phase of the Fraser delta (Pl. 6, *k*). Also in use in the Isakovo period were cleaver-like ground stone knives. These were made not only of slate but also of nephrite (Tolstoy, 1958a, p. 400). In the Kitoi period, the last in the pre-metal sequence, slate was superseded by this superior material. The ground knives and adzes of dark grey cherty slate, so numerous in the preceding periods, become very rare, and polished adzes and knives, including end blades, of green nephrite take their place. Toward the end of the Kitoi, i.e. *circa* 1700 B.C., slate artifacts disappear altogether (Michael, 1958, pp. 61-3). However, a concomitant of the new technology in nephrite was the development in Kitoi times

of stone cutting with slate saws having smoothed beveled edges (Michael, 1958, pp. 62-3; Tolstoy, 1958a, p. 402). Similar slate saws were used during the Marpole and Locarno Beach phases (Pl. 4, *k*) in the manufacture of chisels and adze blades (Pl. 6, note especially groove in Pl. 6, *i*).

In addition to the ground slates, which include projectiles, knives, adze blades, and saws, other traits in the Fraser delta assemblages of the first millennium B.C. suggest influences of the Siberian Neolithic. Among these are the previously mentioned neatly sawed and polished adze blades of nephrite, bone whistles (Pl. 5, *f*, *g*), beaver tooth knives or gouges (Pl. 6, *f*, *g*), and stone fish effigies, perforated for suspension from the middle of the back (Pl. 5, *q*). All of these are prominent features in one or several of the periods of the Baikalian Neolithic (Okladnikov, 1950; Chard, 1958a; Michael, 1958; Tolstoy, 1958a,b). Together with ground slates, they also appear to be characteristic of certain Archaic complexes in eastern North America (Ritchie, 1944; 1951b; Tolstoy, 1958b, pp. 66, 67, Table 1). Significantly, not only ground slates, but also these other traits of probable Asiatic origin are either absent or later in Eskimo sites than on the southern Northwest Coast, a situation which obviously cannot be reconciled with a major premise of Drucker's hypothesis, namely, that such Asiatic influences could have been transmitted only by Eskimo-Aleut and not until their culture had been established on the shores of Bering Sea and southwest Alaska. Although we are not yet in a position to demonstrate the actual routes of diffusion of the above elements, the state of research has advanced sufficiently now so that it is possible to show at least by means of one complex how Northwest Coast Indians could be affected by stimuli emanating from Asia without Eskimos acting as intermediaries.

One of the more interesting crossties of the southern Northwest Coast with Alaska is the microblade and core complex which begins to appear in the Fraser delta region in the early centuries of the Christian era. Expertly made microblades of obsidian were first discovered here in 1949 in the upper horizon of the Whalen Farm site (Pl. 7, *a*; Borden, 1950, pp. 20, 24; 1952, p. 37). Whalen II has a C-14 date of A.D. 377. A few microblades and part of a polyhedral core were found in the most recent layers of the Marpole site, several feet above a C-14 sample dated at A.D. 179. Since their discovery in 1949, polyhedral cores and blades have been found at eight widely distributed sites in the Gulf of Georgia region (Pl. 7, *i*, *j*; Borden, field notes; Carlson, n.d.; J. Sendey, personal communication). How long this complex persisted here has not yet been established. We only know that microblades are no longer present in the developed Coast Salish Phase, which, according to C-14 analysis, began around A.D. 1300.

There is general agreement, based on convincing evidence, that the microblade technology and associated practices were introduced into the New World from Asia. This specialized industry, which forms a prominent component of the pre-Eskimo Denbigh Flint complex, seems to make its appearance in sites of the Bering Strait region at some time during the fourth millennium B.C., although age estimates as well as the results of C-14 analyses differ widely (Giddings, 1951; 1955; Rainey and Ralph, 1959, p. 373; Wormington, 1957, p. 212). From Bering Strait the general spread of microblades across North America has been traced in several recent summaries (MacNeish, 1959b; Taylor, 1959b; Griffin, 1960, p. 809). If, in accordance with Drucker's hypothesis, the

microblade industry of the Gulf of Georgia was transmitted to the Northwest Coast via Eskimo cultures, we should expect to find indications of it on the Pacific coast of Alaska. Significantly, although this technology spread to the Aleutian Islands, where Paleo-Aleut seem to have employed it for more than a millennium (Laughlin and Marsh, 1954, p. 38), polyhedral cores and microblades have not been reported from any site in the Pacific Eskimo area (de Laguna, 1934; 1947, pp. 171-2; 1956; Oswalt, 1955b; Heizer, 1956). On present evidence, we must conclude that this Asiatic complex spread to the Gulf of Georgia via interior routes. This conclusion is supported by archaeological evidence (Pl. 8).

Microblades and cores have been traced up the Yukon and Tanana rivers into the Yukon Territory of Canada (Nelson, 1937; Rainey, 1939; 1953, p. 44; Johnson, 1946a; MacNeish, 1960, pp. 2, 16-23). It is now possible also to follow their diffusion into and through the intermontane region of British Columbia, down the Fraser drainage to the southern Northwest Coast. Fieldwork in Tweedsmuir Park in the central interior of British Columbia produced cores and bladelets at several sites (Pl. 7, *b, c*; Borden, 1952, p. 37, Pl. II). They have also been found a short distance to the northeast near Fraser Lake, again at several sites in the Vanderhoof area (Pl. 7, *d-g*; J. Sewell and Mrs. D. Heron, personal communication; specimens in University of British Columbia collection), and then farther south near Adams Lake (specimens in Vancouver City Museum), and finally at two sites in the Fraser Canyon (Pl. 7, *b*), especially in the top level of site DjRi 3, excavated in 1959. The last two sites are only a relatively short distance from Whalen Farm at the mouth of the river, the site from which the first bladelets on the Pacific coast were recovered. Microblade technology seems also to have spread to the interior of Washington, where lamelles and cores have been found recently at three sites (Butler, 1958; Gallagher, 1959, p. 16, Pl. I, 6, 7; Osborne, n.d.). Earlier Nelson (1937, p. 270) had called attention to the occurrence of polyhedral cores in Oregon and Montana.

Charred pine cones associated with lamellar flakes and a fluted core at a site near the head of Natalkuz Lake in central British Columbia have been dated at 461 B.C. On combining this date with the dates at Bering Strait and at the mouth of the Fraser we obtain a time gradient running from north to south of roughly 3,000 years for the diffusion of this microlithic complex from the port of entry into the New World to the Gulf of Georgia (Pl. 8).

The interior, as this study strikingly demonstrates, is a potentially important diffusion route that must be reckoned with. This point would not have to be stressed especially, if it were not for the fact that this possibility is frequently ignored or even specifically denied (Drucker, 1955; Osborne *et al.*, 1956, p. 122). Although we are not yet in a position to demonstrate it, other Asiatic traits and complexes both of a material and non-material sort could have and, seemingly, did travel similar routes to the Northwest Coast, not necessarily all by way of the Fraser, but also via other river valleys and passes that lead from the interior to the seaboard. Moreover, we need not postulate as much time for their passage as was required for the microblade complex.

Data accumulating from both the Old and New World make it increasingly evident that a protracted intercontinental cultural exchange was in progress in the millennia before Eskimos occupied Bering Strait (Tolstoy, 1958a,b;

Chard, 1958a; Griffin, 1960). At this period, prior to their expansion, and possibly before their culture had attained its distinctive character, the ancestors of the later Eskimos may have inhabited a region—perhaps in southwestern Alaska—some distance away from the main diffusion routes into the New World. Granting this and the possibility of diffusion via the interior, we have a plausible explanation for the seemingly anomalous situation that Asiatic influences become effective on the Northwest Coast either without leaving a trace of their passage in Eskimo sites or that they appear later in Eskimo centers than in the south—evidently after having made the long detour over the Northwest Coast. Moreover, we may have here a clue as to whence some of the important stimuli came that contributed to the efflorescence and expansion of Eskimo culture.

All known cultural manifestations of the Eskimos are relatively recent when viewed in true perspective, i.e. in their relationship to the total sweep of events of North American prehistory. Indications for the beginnings of a riverine-seashore orientation in the northwestern part of the continent are much older in the south than in the north. It is noteworthy, moreover, that the time depth indicated by archaeology is corroborated by glottochronology and that the implications of this time depth are likewise illuminated by the lexico-statistical data. Thus, the calculated time for the divergence of various languages in the Mosan phylum (Wakashan-Chimakuan-Salishan) suggests that the ancestors of the ethnic groups belonging to this language phylum were present in the Pacific Northwest in the seventh or eighth millennium B.C., that Wakashan existed as a separate stock by at least the fifth millennium, and that Wakashan separated into its two main divisions, Nootkan and Kwakiutl, at approximately 1000 B.C. (Swadesh *et al.*, 1954, p. 362, Table I). The extended, but continuous and purely coastal, distribution of Wakashan-speaking groups suggests that their forebears had been present on the seashore long before the divergence of the Wakashan stock began. It is probably no coincidence that it is precisely these groups, the Kwakiutl and especially the Nootka-Makah, who are the most maritime of all Northwest Coast peoples. The Nootka, it seems, were the originators of some of the more typical and basic Northwest Coast elements, such as the D-shaped adze and the important ocean-going canoe (Olson, 1927, pp. 16, 22), and only they hunted *all* the important sea mammals: the sea otter, hair seal, fur seal, sea lion, various species of porpoises, as well as the larger whales (Swan, 1870, pp. 19–22, 30; Drucker, 1950, pp. 171–3). Significantly, it is the Kwakiutl and the Nootka, who, of all Northwest Coast Indians, share with Eskimo-Aleut the most extensive array of specific cultural elements and complexes, including features of such an abstruse and esoteric nature that these parallels are difficult to explain without assuming some historic connection (Lantis, 1938; Borden, 1951, pp. 38–44; Drucker, 1955, pp. 70–8).

If, as these close correspondences suggest, sustained cultural contacts between Wakashan speakers and Eskimos occurred, they must subsequently have been interrupted by the emergence on the Pacific seaboard of the Haida, the Tlingit, and the Tsimshian (Borden, 1951, pp. 37–9). The distinctive aspect of the northern Northwest Coast probably resulted from the blending of the maritime culture pattern previously evolved on the coast with newly introduced features such as the hafted maul, the grooved adze, rod and slat armor, slate

mirrors, matrilineal social organization, and memorial columns. Some of these items in turn were passed on to neighboring Eskimo and Wakashan peoples.

The appearance of these intrusive groups on the seaboard probably led to extensive population shifts, perhaps forcing the Nootka to occupy the rugged western coast of Vancouver Island and perhaps also compelling Eskimo groups to look for new homes farther north and west. Probably we may discern the last ripples of such dislocations in the recent intrusion of Tlingit, Eyak, and Tanaina into territory formerly held by Eskimos (Krause, 1885, p. 99; Swanton, 1908, pp. 396, 414; de Laguna, 1934, pp. 11, 156). Similar population shifts at earlier periods should be detectable archaeologically, and they may account in part for some of the puzzling disrupted distributions along the western shores of North America.

The answers to these and many other problems still lie buried in countless sites along the more than 1,000 miles of the once populous and archaeologically almost unknown coast between the Gulf of Georgia and the Pacific Eskimo region. Obviously, at the present stage of research, historic reconstructions can be of the most tentative sort only and are likely to be subject to drastic revision as new data accumulate. Nevertheless, progress is being made. The historic perspective in the Pacific Northwest has been extended back some 9,000 years. Moreover, it is becoming increasingly apparent that during the last millennia B.C. the Gulf of Georgia region was a center of intense cultural elaboration where influences from Asia overlapped with those coming up the Pacific slope from the south. The thesis that this growth was contingent on the prior development of maritime subsistence patterns in the Arctic and Subarctic is no longer tenable. On the other hand, it will not be surprising if future excavations should confirm and add to present indications that the Northwest Coast exerted a significant influence on the incipient stages and subsequent development of Eskimo-Aleut culture.

RECENT FINDS IN THE YUKON TERRITORY OF CANADA

Richard S. MacNeish

For the past eleven years, the National Museum of Canada has made archaeological surveys and excavations in the Yukon and Northwest Territories, mainly in the boreal forest, but to some extent in the Barren Grounds both on the arctic coast and east of Great Bear and Great Slave lakes. Earlier work consisted primarily of reconnaissance in the Barren Grounds, Mackenzie River drainage, and Yukon arctic coast, and around the delta of the Mackenzie River. That survey was supplemented by limited excavations near Fort Liard and at the east end of Great Bear Lake.

During the past five years, however, the Museum has concentrated its efforts in the Yukon, where two stratigraphic sequences have been established. Along the Firth River on the Yukon arctic coast, three summers were spent digging a huge stratified site called Engigstciak (Eng-ig-she-yak). At that rich site the remains of nine sequential cultures were uncovered, most of which are represented by fairly adequate samples of artifacts as well as by abundant bone and pollen material. The second area has been the southwestern Yukon near Kluane Lake where so far five stratified sites have been excavated.

Since details of the findings in both areas are in print (MacNeish, 1959a; 1960), I shall mention only the cultural content of these two rather different areas and then shall speak about the differences between the two sequences, the relationships of the cultures in terms of the concept of tradition, and how perhaps some of these traditions came into being.

On the Yukon arctic coast the earliest remains are called British Mountain. Stratigraphically they were found buried in clays. Because of a peculiar local solifluction process there was some possibility of intrusion and contamination, but the pollen from the layers associated with British Mountain artifacts revealed that pine, spruce, and white (paper) birch were dominant. Bone material, as might be expected, was mainly of caribou, although there were a few bones of an extinct bison, and one possible horse mandible. These faunal and floral data seem to reveal that when British Mountain people were living on the Yukon coast the climate was warmer and wetter than at present.

There are about 200 artifacts in the British Mountain collection and again because of the solifluction process a few of them may be intrusive. However, any such intrusions must be relatively rare because none of the later cultures have similar artifacts. Most British Mountain implements are flakes, perhaps struck from discoidal cores, with small portions of their striking platforms still adhering. These flakes have been retouched to form a number of tools, including double and single-edge side scrapers, spokeshaves, knives, burins of the central or convex type, hooked crescentic-like graving tools, and laurel-leaf or

lanceolate, unifacial projectile points. Associated with the flakes are a few artifacts that may possibly be prismatic blades. Random flakes without the adhering striking platform have also been used to form scrapers. A minority of the tools are bifaces such as pebble choppers and ovoid bifacial blades or projectile points, and a few of the latter have basal fluting or thinning.

Between this earliest culture and the second phase called Flint Creek there is probably a considerable gap in the Yukon arctic coast sequence. The Flint Creek phase is represented by four components at Engigstciak, one of which has three stages or sub-components in it, and five open sites. In the soliflucted area one of the components is stratigraphically above British Mountain. In the "buffalo pit" at Engigstciak, where there was little solifluction, one of the components is under three of the later phases. The majority of Flint Creek tools were associated with bison bones in strata of sand that underwent little or no solifluction; these are adjacent to or on ancient ocean beaches. Interpretation of the bone and pollen material indicates the possibility that the climate was colder and wetter than at present. The dominant mammals hunted by these people were caribou and an extinct form of bison.

The small Flint Creek collection contains approximately 250 artifacts. One of the most distinctive implement types in the series is the lenticular or Lerma-like projectile point, examples of which were found in the bison kill. Elsewhere Milnesand-like, Plainview-like, and Angostura-like points were recovered. Other tools include: antler or bone leisters, needles, awls, gorges, spatula-like tools, pebble pendants, bifacial knives, slab pebble choppers, scraping planes, end-of-the-blade scrapers, and scale scrapers, often made from large flat blades. There were also rather large crude blades, often retouched, which probably came from conical, polyhedral cores. Microblades, some of which may have come from tongue-shaped, polyhedral cores, perforators or gravers, and specialized flake burin types were in soliflucted layers that may be a late stage of this phase.

Between the Flint Creek phase and the following one called New Mountain there again may have been a considerable time gap. New Mountain components are the most numerous in the area except for those of the Eskimo. Stratigraphically, they were above Flint Creek remains in the undisturbed "buffalo pit", but many of the components occurred in those parts of the site that have been considerably disturbed by solifluction. Pollen associated with the disturbed New Mountain components reveals that grasses were dominant, although tamarack, spruce, and alder also occurred. Perhaps the area was a grassy plain with trees on the valley flanks at the time of the New Mountain occupation. This would suggest warmer and drier conditions.

Mammal bones somewhat confirm this interpretation, for caribou bones were associated with bison, wapiti, and Rocky Mountain goat. Four seal flippers were found indicating that these tundra hunters had at least begun to sample some of the nearby abundant sea mammal resources. The artifacts numbered well over 1,000 including: at least three kinds of neatly chipped burins, burin spalls, crescentic and rectangular side blades, fine microblades and blades struck from cuboid, conical, and occasionally tongue-shaped cores, snub-nosed end scrapers, side scrapers, and bifacially chipped engraving tools. There were also arrowpoints which bear ripple flaking and which are lanceolate, lenticular, incipient stemmed, or triangular in outline. Agate Basin-like spear

points, antler hammers, pointed antler flakes, fish gorges, beamers, fragments of large bifacial knives, *tcí-tho* implements, chipped adzes, sinew stones, and net sinkers also occurred.

The next two complexes at Engigstciak have only been found in disturbed parts of the site, and further work on undisturbed components is very necessary. These two occupation periods may also be of relatively short duration and probably represent developments from the New Mountain phase. Some of the evidence for continuity from New Mountain to the older of these two phases may be due to solifluction action and mixture with earlier remains. Be that as it may, what I have termed the Firth River complex consists of a number of distinctive tool types which together seem to represent a separate entity later than, but related to, New Mountain.

The Firth River complex contains about 400 stone, bone, or antler artifacts, and over 3,000 potsherds. The pottery is the most distinctive aspect of the culture. It is grit-tempered, thin and hard, coiled and perhaps later finished by the paddle and anvil technique. Thong-wrapped paddle- or cord-marked and fabric impressed sherds are dominant. Vessels are usually coconut-shaped. One example has a single row of exterior, evenly spaced punctates around the rim parallel to the lip. Other artifacts include: burin and burin spalls similar to those of the Denbigh Flint complex; arrowpoints and spear points like New Mountain; side- or corner-notched points (occurring for the first time); crescentic side blades, microblades, and polyhedral cores. Most of these cores are like New Mountain except for a few which are flat or tabular. Disc scrapers, adzes, bifaces, plano-convex end scrapers, net sinkers, prismatic antler arrowheads, fish gorges, and antler pointed flakers are the same as in the previous horizon. New tools consist of bifurcated base atlatl points with or without side blade slots, fish-hooks, antler mattocks, shaman sucking tubes, delicate antler leisters, and some stemmed, bone arrowheads.

The next assemblage of artifacts from Engigstciak is called the Buckland Hills complex. Four small patches of refuse in the disturbed area of the site are the basis for this complex. It is placed in its present temporal zone on the basis of seriation (as one of my colleagues has suggested, it is probably more pottery type than cultural complex). The pottery is distinctive in being grit or vegetable tempered, thin, and hard, and it bears exterior, rather haphazard impressions of dentate stamp. This pottery type is completely unknown from other components and it carries obvious implications of relationships to Asia and the eastern Woodland culture of the United States.

In the pits or solifluction cracks containing these sherds there were a number of other artifacts which may or may not have been contemporaneous. These include: straight stemmed and contracting stemmed projectile points, microblades from polyhedral cores, half moon side blades, antler mattocks, antler hammers, crude flake burins, and a few bases of ground stone.

The Joe Creek phase follows the Buckland Hills. Joe Creek is based upon one component from above the undisturbed "buffalo pit" and one poor surface site and eleven components from the soliflucted part of the Engigstciak site. Distinctive features are serrated arrowpoints and linear stamp pottery, an antler spoon, a fragment of what appears to be a comb, as well as a sucking tube, a Bec-de-flute type burin, and chipped burins with ground surfaces. Other artifacts include: crescentic and half moon side blades, a few microblades, blades,

some stemmed projectile points, arrow foreshafts of antler, usually with bifurcated bases, a single male uni-barbed harpoon head, a couple of pieces of ground slate end scrapers, knives, adzes, and antler mattocks.

The final three phases may be considered to be Eskimo and have obvious connections with well-defined horizons in Alaska. The earliest is the Cliff phase and is represented by about 2,000 check stamp sherds and a few linear ones, and about 50 stone artifacts including: ground slate, half moon side blades, three stemmed projectile points, flat end scrapers, beaked graters, disc scrapers, saws, and large bifaces.

Following this is the Whitefish Station phase with open-socket barbed harpoon heads, Barrow Curvilinear pottery, and other typical Eskimo remains. The final culture is called Herschel Island and is a typical Thule component. Artifacts include: crude St. Lawrence Plain pottery and close-socket harpoon heads.

Now I shall turn to the southwest Yukon. Here nothing has been found that even vaguely resembles the earlier British Mountain complex of the coast nor are there any hints from chipping techniques that such sites exist in the interior. Flint Creek also has not been found specifically in the southwest Yukon. There are two complexes however which are very similar to Flint Creek in terms of projectile points, blades, and scraping planes. One is a collection excavated by a trapper from Fort Liard, from a soil zone below one containing microblades, and the other is the materials from the earliest levels at Kluane Lake. These are followed by what I call the Champagne complex. It is known from a dozen surface collections and two excavated layers. Occasionally these artifacts occur in pale loess above glacial deposits. Characteristics of this complex are Milnesand-like points, Agate Basin-like points, Pelly points, flat, flaked end scrapers, blades, flake burins, and pebble choppers. Of course, a few more generalized scrapers and bifacial tools occur. Again, the Champagne complex has no analogy on the coast.

Following this phase is one called Little Arm. It is represented by ten excavated components with over 1,000 artifacts and nine surface sites. Sites of this culture appear at the junction of the pale loess and an overlying pink soil. This latter pink soil has been considered by geologists to represent the time period of the postglacial optimum. Implement types diagnostic of the Little Arm phase include Milnesand-like and Agate Basin-like points, Fort Liard flaked burins, Flint Creek multiburins and burins on blades or microblades, tongue and conical polyhedral cores, unifacial flint drills, flaked perforators, large well-chipped ovoid end scrapers and end-of-the-blade scrapers, serrated blade side scrapers, pebble net sinkers, bone fish spears, microblades, and a few large blades as well as more general artifacts.

This complex seems to have developed directly into one called Gladstone. The latter appears in the top of the pink soils. Four Gladstone components have been excavated and a Gladstone surface site was also found. The Campus site (Rainey, 1939) and the Pointed Mountain site (MacNeish, 1954), lying outside of the southwest Yukon area, are closely related. Diagnostic of this phase are small lanceolate points, incipient stem points, side-notched points with concave or convex bases, Fort Liard and blade burins, net sinkers, notched and flat-topped end scrapers, *tei-tho* scrapers, tabular, conical, and tongue polyhedral cores, and many microblades, often retouched.

Gladstone, in turn, developed into the Taye Lake complex, sites of which occur in brown soils above the pink ones, and under a volcanic ash layer dated at about A.D. 300. The culture is represented by more than 2,000 artifacts from twelve excavated components as well as by artifacts from ten surface sites. Characteristic of it are corner- and side-notched points with concave or convex bases, small lanceolate points, an abundance of crude blades, but few microblades from conical or tabular cores, net sinkers, *tcí-thos*, pebble choppers, large, half moon side blades, flat-topped and end-of-the-blade end scrapers, and an abundance of large bifacial knives, choppers, and scrapers. Taye Lake appears to end a tradition that started in Little Arm and is called the Northwest Microblade tradition.

Above the volcanic ash, in windblown sands, is the Aishihik complex represented by one excavated component with few artifacts and about seven surface sites with perhaps 50 artifacts. At present, it would appear that diagnostic of this complex are such tools as: large and small corner-notched points, large side-notched points with convex bases, thumbnail and flat end scrapers, *tcí-thos*, net sinkers, and adzes, as well as a few generalized scrapers and bifaces.

Aishihik is ancestral to the Bennett Lake phase, which consists of cultural remains, in some instances, including historic goods, occurring in humic soils. The tools of this complex represent the material remains of the historic Athabaskan tribes. Over 300 artifacts from five excavated components and more artifacts from twenty or more surface sites occur at Bennett Lake. Small triangular, side- and corner-notched points, *tcí-tho* scrapers, thumbnail scrapers, copper tinklers and pins, abraising stones, as well as antler and bone tools such as fish-hooks, leisters, fish spears, fleshers, needles, multibarbed arrows, flakers, and gorges, are characteristic.

In brief, the above descriptions summarize the two sequences, in which there are many inadequacies. For the most part, samples of artifacts from all horizons are insufficient and not enough components have been thoroughly excavated. Both sequences have serious gaps in them. On the coast, there is no continuity and an actual stratigraphic break between British Mountain and Flint Creek. This is also true for Flint Creek and New Mountain. After Joe Creek, there appears to be a gap before the Cliff complex, as well as a gap after it before the other Eskimo remains. In the interior our initial complexes are insufficiently known and the relationship between Kluane and Champagne is not understood. There are some indications that Taye Lake lasted longer than we previously suspected and may have to be divided into two or more complexes. Further, there is a gap between Taye Lake and Aishihik.

Can these sites be classified in such a way as to indicate their relationships to others in the Arctic, as well as to each other? Although it is probably premature, I have attempted to classify our various complexes into a series of traditions that better show the relationships in time and space. This concept is useful for it helps to bring together a large mass of uncoordinated data and to show in addition how northern cultures developed in time, and moved possibly by either migration or diffusion through the Arctic and Subarctic. By a tradition, I mean a complex of tools that persisted, with few changes, through both time and space and which seems to represent a specific way of life.

At the earliest levels, there is the British Mountain tradition. It is characterized by crude blades and a series of tools unifacially fashioned from flakes

struck from discoidal cores. In the New World, it appears to be related only to the Kogruk complex (Campbell, 1961a) found in northern Alaska. Superficially, it resembles some of the Paleolithic complexes found in the trans-Baikal and Lena River areas of Siberia such as at Mal'ta and other sites (Bonch-Osmolovsky and Gromov, 1936; Okladnikov, 1953). There are many artifact similarities between British Mountain and these sites but it is too soon to understand exactly what they mean.

Next comes the Cordilleran tradition that is represented by the Kluane complex in the southwest Yukon, Flint Creek horizon in the northwest Yukon, the Klondike site near Fort Liard, and the Kayuk site (Campbell, 1959; 1962¹) in northern Alaska. These sites have many similarities to the earliest ones in southern British Columbia (Borden, 1960), Washington (Daugherty, 1956), and Oregon (Cressman *et al.*, 1960). They also have artifact similarities to late Paleolithic ones near Vladivostok, Siberia. Again, our data are too fragmentary to permit a true understanding of what these artifact similarities mean.

Seemingly next, is what I call the Yumoid or "Plano" tradition which appears to be an intrusion into the north from the Great Plains of the United States and Canada. In our areas of excavation, Champagne in the southwest Yukon would be representative of it. This tradition appears to have lasted somewhat longer in the Mackenzie and Barren Grounds to the east than it did in either the Yukon or the Great Plains. Thus, this latter is in part contemporaneous with our next tradition called Northwest Microblade, represented in the southwest Yukon by Little Arm, Gladstone, and Taye Lake. At later times, the microblade tradition appears to have spread into the Mackenzie and British Columbia regions and there is the possibility that the Tuktu complex (Campbell, 1961b) in northern Alaska and the Palisades complex (Giddings, 1960b; 1962) near Bering Sea are late intrusions of it to the north and east.

Overlapping with the later parts of this tradition is the Arctic Small-Tool tradition (Irving, 1957) of the arctic coastal drainage. New Mountain, Firth River, and perhaps Buckland Hills are representatives of it on the Yukon arctic coast. These seem related to a host of sites from the Seward Peninsula in western Alaska to the Independence culture of Greenland.

After this tradition there is another, on the arctic coast, which I have termed Inuk. Inuk reflects an Eskimo way of life. Cliff, Whitefish Station, and Herschel Island are representatives of it on the Yukon arctic coast and Inuk sites are, of course, widespread throughout the Arctic. Seemingly contemporaneous with it in the interior is the Denetasiro tradition which in the southwest Yukon is represented by Aishihik and Bennett Lake. It, in turn, seems to contain the material remains of a whole series of Athabaskan peoples in the northwest boreal forest. For the moment, these traditions, I suggest, may be helpful in plotting relationships, diffusions, and migrations of culture. They are, of course, subject to change and modification as more data become available.

Now the question arises concerning how these traditions (except for the first one) begin. Do they represent migrations of people with specific cultures from Asia? Our present evidence indicates they do not. I suspect the various elements of each tradition came from a variety of sources and by a variety of processes. I believe they somehow coalesced in certain areas at certain times, perhaps due in part to ecological conditions. These coalescences were possibly

¹All 1962 dates refer to papers in this volume.

adapted to certain environmental niches. They then spread through a similar environment and continued to exist in it until either that environment changed or a new way of life, perhaps better adapted, replaced them. For example, I shall speculate about the origin and spread of the Northwest Microblade tradition.

It seems to have formed somewhere in the interior of Alaska or the western Yukon about 7,000 years ago. It would have taken from the Kluane and Flint Creek horizons already in that region such elements as Fort Liard, Flint Creek, and blade burins, end-of-the-blade scrapers, and conical cores and blades, as well as a few bifacial types and unifacial scrapers. From the northwest-moving Yumoid tradition, it might have acquired the Agate Basin-like and Milnesand-like points, the flake perforator, and perhaps the snub-nosed end scraper. It might have acquired from Asia, tongue-shaped cores, microblades, and unifacial drills. These may have been invented locally, the net sinker (i.e., gill nets), *tcithos*, and some variety of fish spear. Such a combination of tools from diverse sources, and acquired by different processes, made a tradition which seems to have been well adapted to the environment of central Alaska and the southwest Yukon at the beginning of the postglacial optimum. Such a tradition may also have been adapted to the environment of that time period in interior British Columbia and the interior of the Canadian Northwest Territories. Thus this tradition moved in to this similar environment slowly, by diffusion and migration, perhaps changing slightly through time as it met new situations and as it met new cultures. It persisted in that greater area until the end of the postglacial optimum when it was gradually replaced by a new way or ways of life that may have been better adapted to that area, and which perhaps arose by a similar process in that or other areas.

If this is the manner by which traditions arose in the New World, then it seems likely that Giddings (1957) is correct in his hypothesis concerning the slow expansions of human populations into new territories. Further, such a process would account for the fact that we see no total complexes, like those of America, in Asia; and little evidence of rapid replacements of peoples and cultures in the New World, but instead, a great many local inventions, specializations, and developments plus a few odd Asiatic traits.

Perhaps future work will clarify and better define the above speculations. Certainly much new data have been brought forth during the last few years by many participants at this conference. This indicates that many of our northern problems will shortly be seen in the light of much newer and better evidence than ever before.

CULTURE CONTACT IN THE BERING SEA: BIRNIRK-PUNUK PERIOD

Robert E. Ackerman

Recent publications by Ford (1959), Giddings (1960a), and Levin (1958b; 1960a) have shown that a reappraisal of the archaeological picture in the Bering Sea region is necessary. Radiocarbon dates of a sometimes seemingly contradictory nature also call for a new look at the chronology. Additional field work is necessary before the cultural sequence in the Bering Sea can be fully understood. What shall be attempted here is a brief look into one time period along the continuous chain of events. Specifically I shall refer to the Birnirk-Punuk period of Bering Sea archaeology as viewed from sites on St. Lawrence Island.

The archaeological cultures from Okvik or Old Bering Sea to late pre-historic times fit into a broad cultural continuum, marked by a rather unchanging ecological adaptation. The hunting equipment used for securing sea mammals and sea fowl has in some 1,500 to 2,000 years undergone only relatively minor changes expressed mainly in stylistic variations. It is, however, these stylistic variations in terms of engraved design elements and minor changes in form that have allowed archaeologists to set up periods in the Bering Sea culture continuum.

The differentiation into periods and the preoccupation with individual stylistic changes tended to cloud the picture of an onward-moving process and to encourage the formulation of separate distinct cultural periods unique in time. This type of formulation is itself part of a historical process, as research in any given area tends to set up periods and only later tries to enclose these periods in an inclusive scheme.

As more and more data become available from field studies, we begin to talk of a continuum. We see the gaps close, and cultural periods begin to overlap. I should like to go back to a point in that continuum when the Bering Sea area was the scene of a remarkable growth of the Eskimo population. Trade and internecine warfare were the advantages of an expanding economy. The population was large and successful if one can judge from the large middens that they left behind. This is the Birnirk and Punuk time period, with sites on both the Siberian and American sides.

In the summer of 1958 I carried out for the University Museum, University of Pennsylvania, a survey of St. Lawrence Island with the hope of finding sites that might lead to a clarification of cultural process in the Bering Sea region. One large site about ten miles to the east of the Kukulik site, provided a small window into time. This site, locally called S'keliyuk, contained two rather large middens. The rear midden, which we partially excavated, measured

roughly 260 x 130 x 10 feet. The surface was marked by the depressions of house pits. Our excavations in the area of one of these disturbed structures of boulders and whale bones gave us some 6,000 items, but relatively little information about the structure itself as the house was demolished by an intrusive meat cache. In the midden, we found extending from the surface down to a depth of 5 feet, both Birnirk and Punuk harpoon head types which could not be separated out into levels. At a depth of 7 feet 9 inches foundation logs of another house were revealed. The one harpoon head found below these logs was a typical Punuk harpoon head.

The Birnirk harpoon head type immediately caught my interest for the role of the Birnirk culture is poorly defined on St. Lawrence Island. A few Birnirk harpoon heads have been found at Kialegak, Kukulik, and the Gambell sites. Their numbers were very small in proportion to the number of Punuk harpoon head types with which they were sometimes associated. It soon became apparent at S'keliyuk that Birnirk harpoon heads were numerically significant. Twenty-nine (roughly 30 per cent) of the 97 walrus and seal harpoon heads were of the Birnirk type.

Twenty-seven of the Birnirk harpoon heads are made of bone, probably walrus bone. Two are made of ivory. All have open sockets with two side blades. The barb and opposite side blade type of the Kugusugaruk and Birnirk sites at Point Barrow do not occur here. Two forms, side blades parallel to the line hole (type G, Geist and Rainey, 1936; types IIx and II(a)x, Collins, 1937) and side blades perpendicular to the line hole (type H, Geist and Rainey, 1936; types IIy and II(a)y, Collins, 1937) are found in almost equal numbers. All have a bifurcated spur, asymmetrically or symmetrically placed. The fore-shaft is secured in the harpoon-head socket by passing a thong through two lashing slots or one slot and over an opposite groove. The latter method of fastening is rare as it is represented by only one example. The heads are also characterized by backwards bending. The cancellous portion of the bone is always on the front face of the head. Eight harpoon heads have shell side blades, one has chert, and one has slate. Side blades are missing in the remainder (Fig. 1).

Only four of these harpoon heads are without decoration. Two have incised lines which extend from a median point near the forward end of the head downwards to rudimentary side barbs. Ten have lines which diverge from a median point forward of the line hole, and pass on each side of the line hole to run into the lashing slots. A few heads have spurs extending from these lines. This is the design element characteristic of the Birnirk type from the Birnirk site and also Early Punuk examples on St. Lawrence Island. A short incised triangular area above the line hole, similar to the Birnirk type from the Birnirk site, was found on one head (Fig. 1, A) (Ford, 1959, Fig. 26, d). Thirteen of the Birnirk heads have Punuk design elements—Y figures, line and dot, free dots in enclosed areas, spurred lines, and circle-dot (Fig. 1, B).

The decorative treatment of the sides of the harpoon heads shows considerable agreement with Ford's Birnirk, Alilu, Naulock, and Natchuk types from Point Barrow. Sixteen heads have scalloped or stepped sides (Fig. 1, A, B, D). Shallow grooves, often called rudimentary side grooves, have been incised in the low-cut scalloped or stepped areas (Fig. 1, A-D). There can be from one to

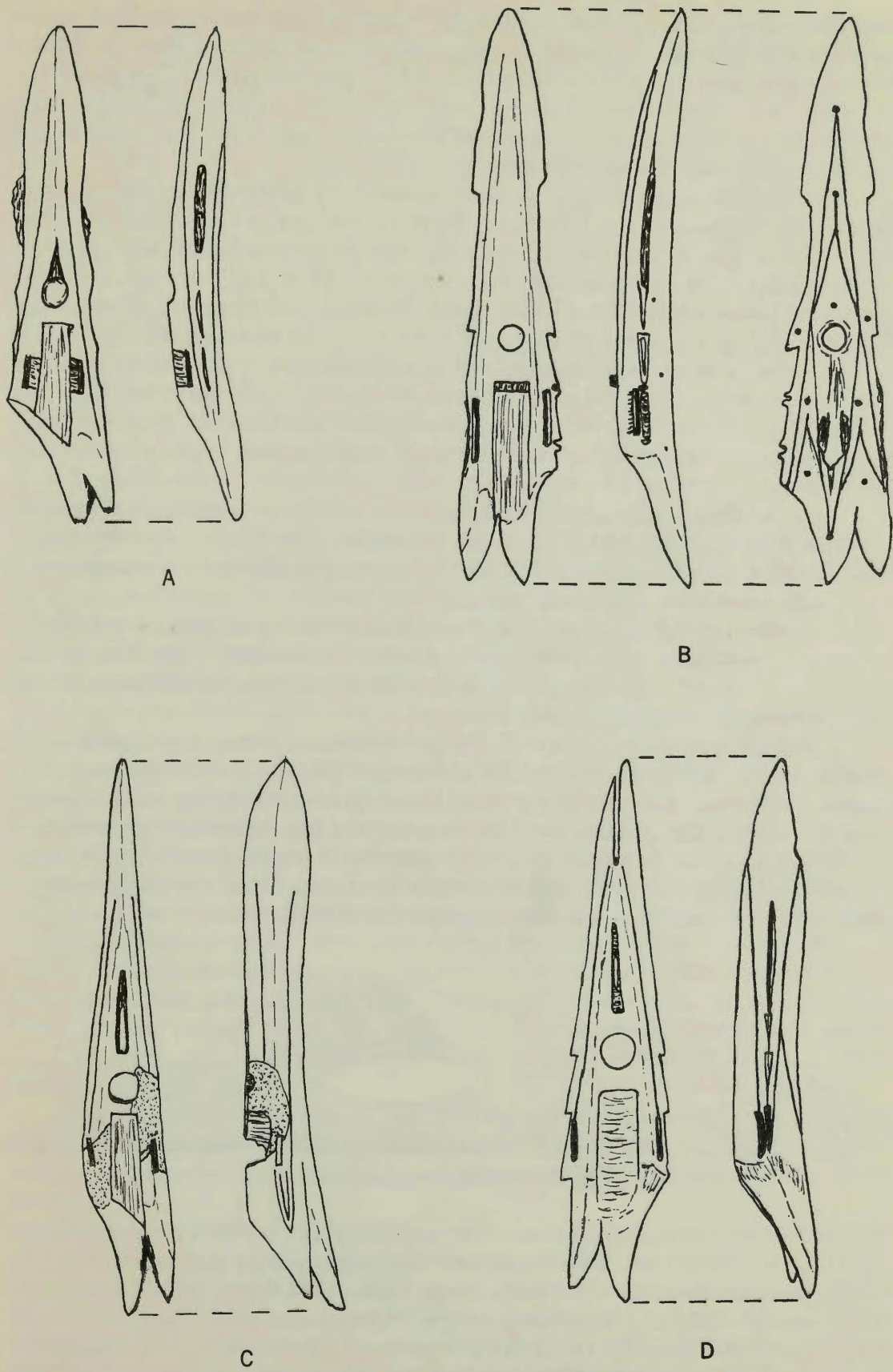


Fig. 1. Birnirk harpoon head types.

four grooves to a side. Three heads have transverse cuts across the high points between the scallops (Fig. 1, B). This also occurs as an element in Ford's Birnirk type from the Birnirk site at Point Barrow, and in the Birnirk burials at Point Hope (Larsen and Rainey, 1948, Pl. 87, 1). Occasionally the high point is so accentuated that it is almost free standing and when cut gives the appearance of a set of small side nipples.

The decorative pattern of shallow grooves in a scallop or step-cut side appears on harpoon heads (Type A, style I), and on the body of a human figure (Rainey, 1941, Fig. 28, 2) from the Okvik site on Punuk Island; on an ulu handle from the Uwelen site (Rudenko, 1947, Pl. 3, Fig. 24); and in Ford's types mentioned previously—Birnirk, Alilu, Naulock, and Natchuk (Ford, 1959, Fig. 26, *a, d, f, g, i, j, o*; Fig. 27, *a, f, i*; Fig. 29, *j, l*). In Siberia a decorative side groove is found underneath the barb of a classic Birnirk type with an opposite side blade at the Uwelen cemetery (Levin, 1958b, Fig. 3, *v*), Sarychev Bay, and Second Bay (Beregovaya, 1953, Fig. 7, 4; Fig. 8, 2). These 29 harpoon heads closely approximate in form Ford's Ooyfik and Tuquok types (Ford, 1959, pp. 77–81).

Two harpoon heads are not included with the 29 harpoon heads discussed previously as they have end blade slits instead of side blades, but they share some features such as bifurcated spurs, Punuk designs, decorative side grooves, and raised areas with transverse cuts.

The associated Punuk harpoon heads are of the open and closed socket types that have been extensively described by Collins (1937) for Punuk and St. Lawrence Island. There is nothing unusual about these Punuk heads except the small size of the closed socket forms.

Whaling harpoon heads are of the general Punuk form, although there is considerable variation in the design elements. Dashed lines, lines and dots, random scratched, and alternating spurs which produce a zigzag pattern are all forms of decoration of the Punuk culture, but the last mentioned pattern, that of alternating spurs, is placed in a band running at angles to the medial ridge (Fig. 2). This is not the common pattern found on Punuk whaling harpoon heads, and is a somewhat unique design pattern for the site.

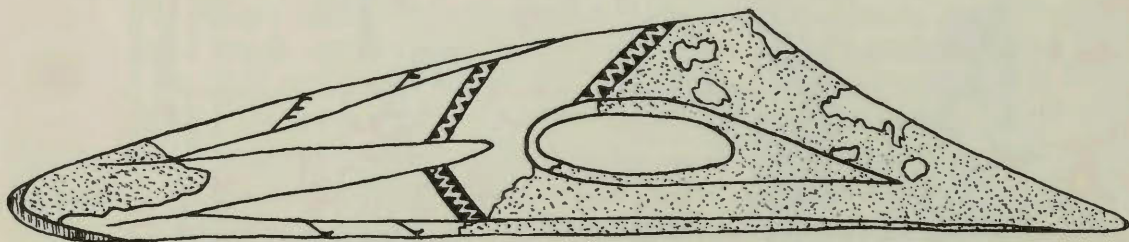


Fig. 2. Whaling harpoon head.

Arrowheads are made of bone (18) and ivory (13) with bone predominating (Fig. 3). The bone arrowheads are flat, roughly oval in cross-section and are barbless or have only one single large barb. The tangs are tapering with or without a shoulder. Some have a slight enlargement of the tang about half-way towards the end (Fig. 3, D–H). The ivory arrowheads are triangular or diamond-shape in cross-section and have one, two, or multiple barbs. The tangs are tapering with a shoulder to mark the separation of body and tang

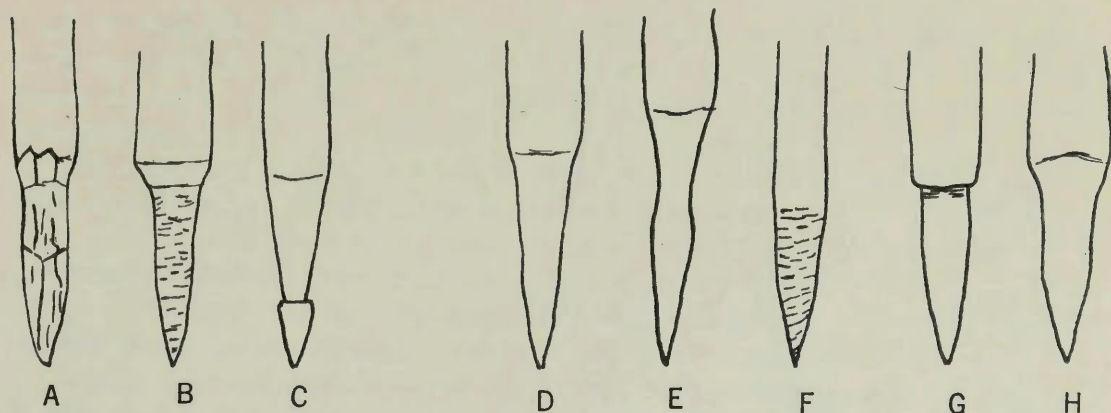


Fig. 3. Arrowhead tangs.

(Fig. 3, A-C). One of the ivory heads has a raised ridge in the middle of the tang (Fig. 3, C). According to tang classification these arrowheads, except the last mentioned knobbed tang type, fall into the same time period which is Punuk on St. Lawrence Island, and Birnirk at Point Barrow. No examples of a spurred tang were found. The one knobbed tang type was found close to the surface and probably represents a more recent culture as was indicated also by a late prehistoric to modern harpoon head.

Blunt arrowpoints for birds are made of ivory and have a tapering tang with or without a marked shoulder to delimit the tang from the body. These are more like Punuk types than those from Point Barrow.

Twenty-three complete and fragmentary bird dart side prongs were found at the site (Fig. 4); of these, all but one were made of ivory. They belong to Ford's type A of the Birnirk site (Collins, 1937, types 1 and 2). Seven have no lashing slot, which is replaced by a side groove (Fig. 4, C). Nine have notched elevations on the edge of the prong in addition to the lashing slot (Fig. 4, A, B, D). These notched elevations are similar to those noted previously on the Birnirk-like harpoon heads. Collins (1937, p. 132) states that this type of side prong decoration belongs to the early Punuk period on St. Lawrence Island. Notched elevations occur also on the prongs from the Birnirk and Kugusugaruk sites. Five side prongs have lines on either side of the lashing slot and drilled holes above and below (Fig. 4, B). This type of decoration is similar to the bird dart side prongs from the Early Punuk level of Miyowagh at Gambell (Collins, 1937, p. 132), but does not occur on the bird dart side prongs from the Point Barrow area.

The butt ends of the bird dart shafts are flattened laterally and have an upper medial ridge. This may aid in holding the dart to the throwing board and is a feature also noted on the dart shafts from the Kugusugaruk site at Point Barrow.

Ivory butt pieces, which fit into the ends of dart shafts and have depressions for the prong of the throwing board to fit into, are considered by Ford (1959, p. 114) to have been possibly more common at Point Barrow in Birnirk times than in Old Bering Sea and Punuk periods on St. Lawrence Island. Four of Ford's type B, tanged to fit into the dart shaft were found at S'keliyuk. Two butt pieces had been previously reported by Collins (1937, pp. 134, 220) from St. Lawrence Island.

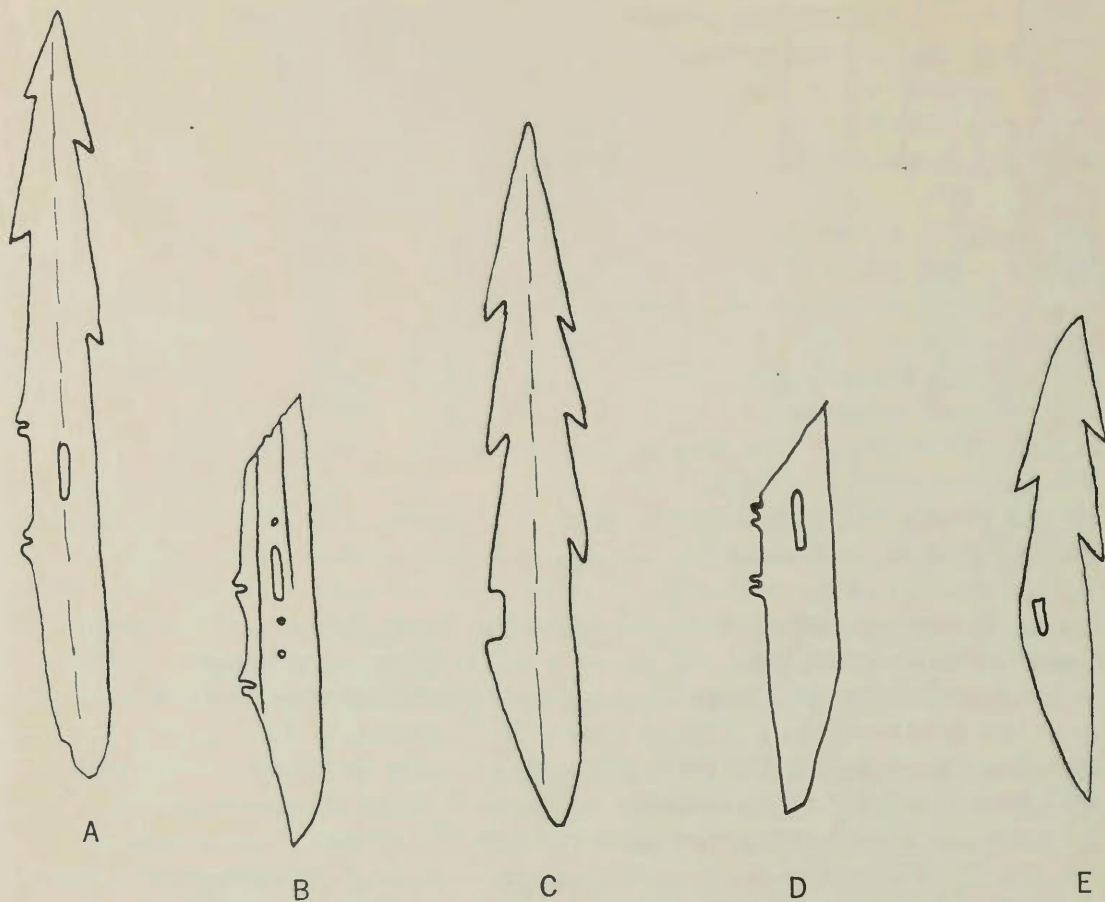


Fig. 4. Bird dart side prongs.

In the remaining inventory of bone and ivory there is nothing else that strongly indicates a contact with Birnirk culture. In the stone inventory, ground slate tools are predominant. Artifacts of wood and baleen are quite similar in Punuk and Birnirk cultures making differentiation difficult. Unfortunately, those wooden artifacts which are diagnostic for the Birnirk culture, such as throwing boards and adze handles, were not found.

Pottery was abundant at the site. Over 2,000 sherds were studied with the view towards defining minor types. There are a few instances of paddle-marking, but the majority of the sherds have been smoothed over with no subsequent decoration. The temper is sand with some gravel. The paste is medium to coarse and often darker in color than the exterior surfaces. Lamp sherds could be differentiated from cooking vessels as they were thicker, not as well constructed, and when large enough to ascertain shape, had a low shallow saucer or bowl form with a flat to rounded bottom. Cooking vessel sherds were thinner, well compacted, with well-defined rims and a variety of lip forms. One shallow vessel with the sides converging inward at an angle of about 45 degrees toward the flat bottom was 8 cm. high, and had a diameter of 38.6 cm. It has not been possible to reconstruct the taller cooking pots, but flat-bottomed base sherds are fairly common, indicating that these also may have had flat bottoms. Two large heavy sherds that fit together indicate a platter form similar to a wooden meat tray. Small thin-walled clay vessels

with vertical sides and flat bottoms were found. One had a height of 4.5 cm. with a side-wall thickness of 5 mm. This pot and others of its kind were probably toys. Suspension holes were found on a few sherds with elevated lip sections.

The pottery falls into a single type, St. Lawrence Plain, as defined by Oswalt (1955a, pp. 33-4). The general lamp form is common to Old Bering Sea, Birnirk, and Punuk cultures. The flat-bottomed cooking vessel form seems to be derived from Old Bering Sea forms and is closer to the cooking vessels from later sites at Point Barrow (Utkiavik-Nuwuk, Nunagiak) than the Birnirk site with its conoidal-based pots (Ford, 1959, pp. 199-204).

From the brief description of the Birnirk harpoon heads and bird dart parts it is apparent that these traits were probably derived from a people with a Birnirk-like culture. The majority of the artifacts at the site are of the Punuk culture. The recipient culture, Punuk, is dominant on St. Lawrence Island at this time. No pure Birnirk site has been found on the island. The Birnirk traits which occur during the Punuk period are thus intrusive elements as other regions, namely Point Barrow, have Birnirk culture as a distinct cultural entity. It is also in other regions that the antecedent forms of the Birnirk harpoon head types occurring on St. Lawrence Island are found.

Archaeologically, the culture contact situation at the site of S'keliyuk is characterized by trait-unit intrusions rather than site-unit intrusions (as defined by Willey *et al.* 1956). This analysis seems to hold equally true for all of the sites having Birnirk traits on St. Lawrence Island, and will be modified only when a site containing predominantly Birnirk traits is found on the island. At S'keliyuk there was a modification of the major intrusive trait. The Punuk peoples engraved their own design elements on the Birnirk harpoon heads while retaining the form and material. An alternate hypothesis is that the harpoon heads were obtained in trade, with the modification occurring at some nearby site on the Siberian mainland. This would necessitate, however, that a similar process which has been postulated for S'keliyuk occurred at that site. To date, such a site has not been found.

The occurrence of Birnirk type harpoon heads in association with Punuk decorated objects is not limited to St. Lawrence Island. N. N. Dikov in 1957, while on a reconnaissance of the northern coast of the Chukotsk Peninsula, found in one of the houses he excavated at a site on Cape Vankarem, several objects decorated with Punuk ornamentation. With these was a Birnirk toggle harpoon head. The harpoon head had an open socket, side blades perpendicular to the line hole, an asymmetrical spur with four barbs, round line hole, single lashing slot with opposite groove, and was ornamented with two lines on each side (Dikov, 1958, pp. 56-7).

Levin's work at the Uwelen cemetery, which I was able to see in Moscow and Leningrad, has revealed instances of two or possibly three cultures being found together in single graves. In 1957 Levin (1958b) discovered several graves; two (Nos. 4 and 17) contain Birnirk harpoon heads. The inventory of grave 4 consists of two Birnirk harpoon heads, one Old Bering Sea harpoon head, one undecorated harpoon head, foreshaft, wound pins, finger rest, bola weights, lance blade, and ivory zoomorphic figures. Grave 17 contained three Birnirk harpoon heads, one Old Bering Sea head, and one Okvik head in addition to sun goggles with Old Bering Sea decoration, arrowheads (one with Old

Bering Sea decoration), foreshaft, leister prong, and bag handles. There is the distinct possibility that the Okvik and Old Bering Sea artifacts may have been dug up from older areas of the site and then later placed in the grave of the individual who made the Birnirk harpoon heads. Since there are few graves containing Birnirk traits at Uwelen, the association of Birnirk culture with other cultures at Uwelen is still questionable. The instances of Okvik and Old Bering Sea harpoon heads occurring together in single graves are too numerous to be questioned. Classic Old Bering Sea harpoon heads often have Okvik design elements and thus Levin is faced with the problem of trying to determine what constitutes a type. This is the overlap period of Okvik and Old Bering Sea and it will remain for Levin to determine the breakdown of stylistic variants for this period.

Carbon-14 analysis has not been very helpful in determining which culture precedes the other, but it has, I believe, clearly indicated that there was a considerable overlap of cultures. Recently, the radiocarbon laboratory of the University of Pennsylvania re-ran sample C-505 taken from Giddings's Okvik house at the Hillside site, St. Lawrence Island. This sample used by Giddings (1960a) as the base line for the St. Lawrence Island sequence was dated by Libby (1952, p. 90) using the solid carbon method at 307 ± 230 B.C. Using the CO_2 method the laboratory at the University of Pennsylvania obtained a date of A.D. 499 ± 65 (Ralph and Ackerman, 1961, p. 8). This places the date of Giddings's Okvik house in the time range for Old Bering Sea that was established by a series of Carbon-14 dates. This new date does not call for a reinterpretation of the artifacts from Giddings's Okvik house, but it does point out that the house was much closer in time to those houses excavated by Collins at the same site.

The foregoing does not deny that at some point in time pure Okvik, Old Bering Sea, Punuk, Birnirk, and Thule sites did exist. What is emphasized here is that at points along the time sequence there were cultural overlaps that tie the entire sequence into one broad continuum. These overlaps are clearly represented archaeologically by sites using elements of both cultures. The site of S'keliyuk thus adds another frame or two to the moving picture of culture history.

SIDE-NOTCHED POINTS NEAR BERING STRAIT¹

J. L. Giddings

Side-notched projectile points were revealed in 1959² in two distinct and widely separated associations, lacking pottery and grinding, at Cape Krusenstern, Alaska. The locality is on the north side of Kotzebue Sound, about twenty miles northwest of the town of Kotzebue. Notched points were previously unsuspected as culture markers of importance in this western Eskimo area. It was thought, instead, that excavations would show a rather smooth transition from the Denbigh Flint complex upward through time to Ipiutak culture.

The known distribution of side-notched points had included only two or three from the Bering Strait region. One had turned up in a house floor dated at about A.D. 1600 in the Black River site (Giddings, 1952b, p. 121) of the upper Kobuk River valley, another was known in unassociated materials from St. Lawrence Island in the University of Alaska collection. Farther afield, Froelich Rainey had reported a notched point picked up on a gravel bar in the Circle Hot Springs vicinity (Rainey, 1939, Fig. 6, 7), some 500 miles away in the interior of Alaska, and two of possible great age from the muck-silt deposits near Fairbanks (Rainey, 1939, p. 397, Fig. 9, 4, p. 399, Fig. 11, 1). More recently, in the North Pacific rainbelt zone of southern Alaska, William Irving has found notched points with other flints in a site of the Susitna River drainage (Irving, 1957, pp. 47-8, Pl. II, 3-6), and Ivar Skarland and Charles Keim (1958, p. 80, Pl. II) have reported the discovery of notched points at a site on the Denali Highway near Paxson, Alaska. From northwest Canada R. S. MacNeish has recently found a few side-notched points with pottery in his Firth River phase (MacNeish, 1959a, pp. 50-1, Pl. IV). The very few other notched points known across the interior of northern Canada (e.g., Harp, 1958; MacNeish, 1954) form no clearly defined trail to where they appear prominently in the recent Sadlermiut sites of Southampton Island (Collins, 1957b, Pl. 5, *l, m*).

The notched points at Cape Krusenstern can be placed in a reliable time order by means of "beach ridge archaeology." Successions of ridges, none more than three meters above present sea level, have been forming at the cape since, presumably, sea level reached its greatest post-Pleistocene height (Pl. 1). By one count—and all counts are necessarily approximate—114 ridges have

¹This paper was submitted shortly after the New Haven meetings and before the field season of 1960. Since the writer has had no opportunity to take part in the discussions reported in this volume, the reader is referred to a background paper on beach-ridge archaeology (Giddings, 1960b) and to a summary article written after the 1960 field season (Giddings, 1961). Field work of 1961 further confirms the relative dating of cultures described in the present paper.

²By a field party headed by the writer, and including Professor Hans-Georg Bandi, Mr. William S. Simmons, and Mr. Samuel Friedman, through the support of a grant from the National Science Foundation to Brown University.

formed without serious erosion by the sea. Unconformities exist, and certain beaches were beaten against and held static by autumn storms over many centuries while the succession continued to build farther along. These unconformities are helpful rather than not in reconstructing the age of the beaches. In general it is possible to walk along the crest of a specific old beach and assume that by far the greater amount of cultural material lodged in it or manifest on its surface belongs to a time when the beach was very near the seashore. There would be little incentive for people to build or camp far from view of the food-giving water. Thus, the beaches at Cape Krusenstern show the following cultural affinities. On Beach 10 (Pl. 1, "A") was excavated a Western Thule (Larsen and Rainey, 1948, pp. 170-5) house estimated to be 1,000 years old. Between Beaches 30 and 34 (Pl. 1, "B"), and stretching nearly six miles in length, are found the houses and other features of a local phase of Ipiutak culture (Larsen and Rainey, 1948) essentially like that of Point Hope. Behind the Ipiutak series, which incidentally contains no pottery or ground slate, are found the flints and check-stamped pottery of the Norton (Giddings, n.d.) culture of the northern Bering Sea region; then flints and linear-stamped pottery roughly comparable with those of the Choris culture (Giddings, 1957). On the earlier of this series, Beaches 41 to 53, were located, buried under a few inches or a foot or more of peat and moss, the large jawbones, vertebrae, and ribs of baleen whales, sometimes in association with fireplaces and artifacts. Our first excavation there in 1959 on Beach 53 brought to light a large house (Pl. 1, "C") of driftwood with a semicircular rear wall, front corners, a short passage, and a separate room opening into the front of the house. The artifacts from this house define the first of the two notched point horizons with which this report is concerned. Surface indications beyond these beaches give interesting hints of what is to be revealed by other close testing of the Krusenstern beaches. On Beach 80, for example, was found a burin spall. However, it was not before Beaches 101 to 103 (Pl. 1, "D") that we picked up the small and delicate flints of the Denbigh Flint complex in numbers.

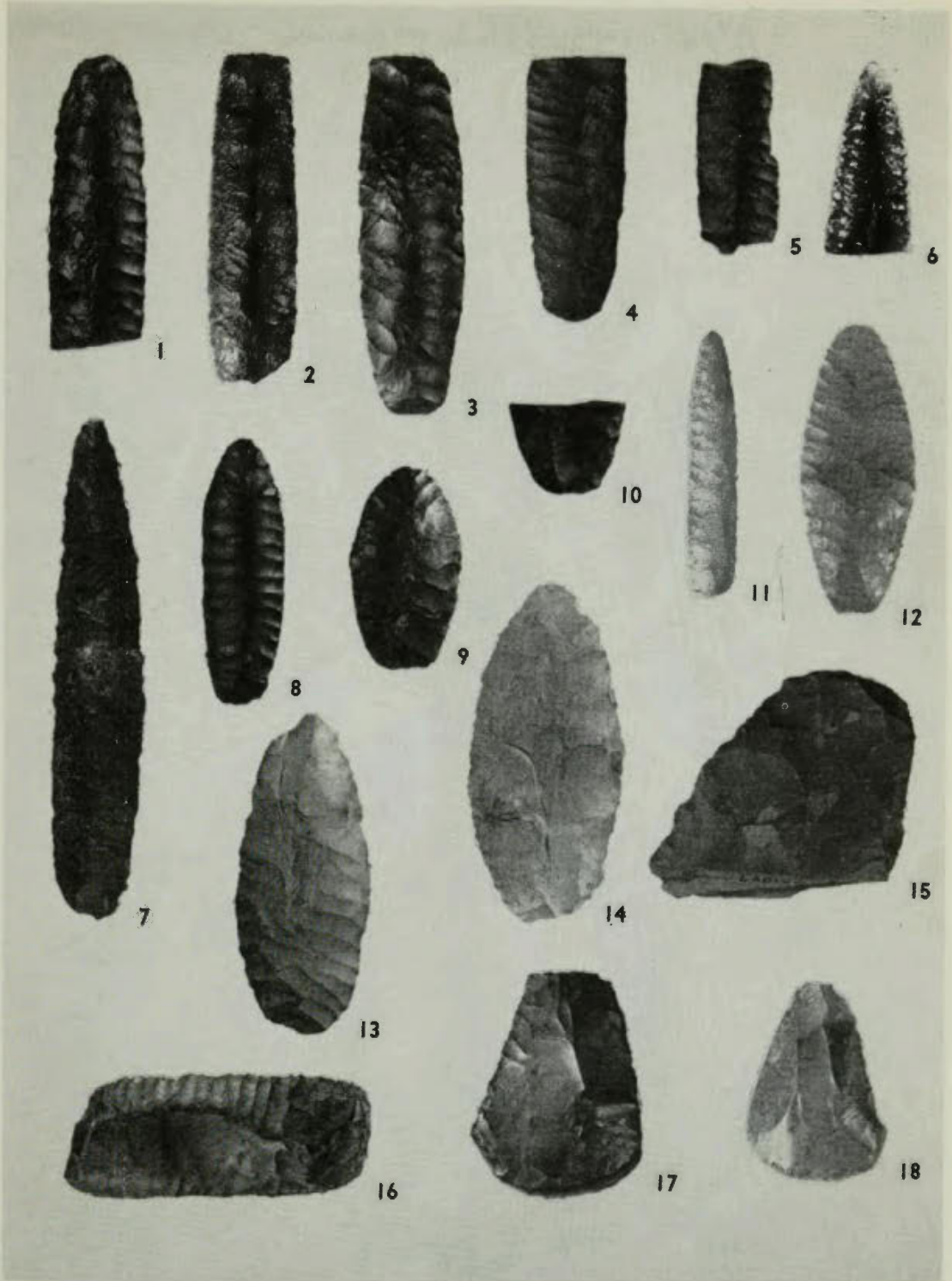
The house excavated on Beach 53 contained the bones of many seals, a few birds, and a whale vertebra. Caribou bones were nearly absent. The flints found in and about this house floor include a large chert ulu (Pl. 2, 5) carefully flaked about both edges of the curved surface, in a manner unknown in the Eskimo sites; a long chalcedony bifaced knife or lance blade (Pl. 2, 18); and several chert and chalcedony thick bifaces (Pl. 2, 1-4) which strongly suggest the points of large whaling harpoon heads. A few side scrapers or flake knives (Pl. 2, 16), a probable adze head (Pl. 2, 6) of chalcedony of unique form, and a variety of side-notched projectile points (Pl. 2, 7-9, 11-13), notched scrapers (Pl. 2, 10, 14, and 17), and notched knife blades or drill points (Pl. 2, 15) all occurred in the house excavation. This assemblage is out of the line of development that one might expect between the Denbigh Flint complex and the Choris-Norton-Ipiutak range of later sites. With its strong implication of whaling, it seems intrusive into a local pattern. These were no wandering inland people, however, as is shown in part by their remarkable food preferences in this region where caribou have figured strongly in the local economy.¹

¹W. S. Laughlin has called to my attention the two 14-inch blades reported by Hrdlicka (1945, Fig. 190, p. 447, 3-4) and a chipped ulu (Laughlin, 1952, Pl. 3, p. 46, C) from the Aleutians, which bring up the possibilities of a connection between these two regions at an early time.



Photo: U. S. Coast and Geodetic Survey

PI. 1. Aerial photograph of Cape Krusenstern, Alaska, showing the locations of archaeological sites on beach ridges and a hillside.



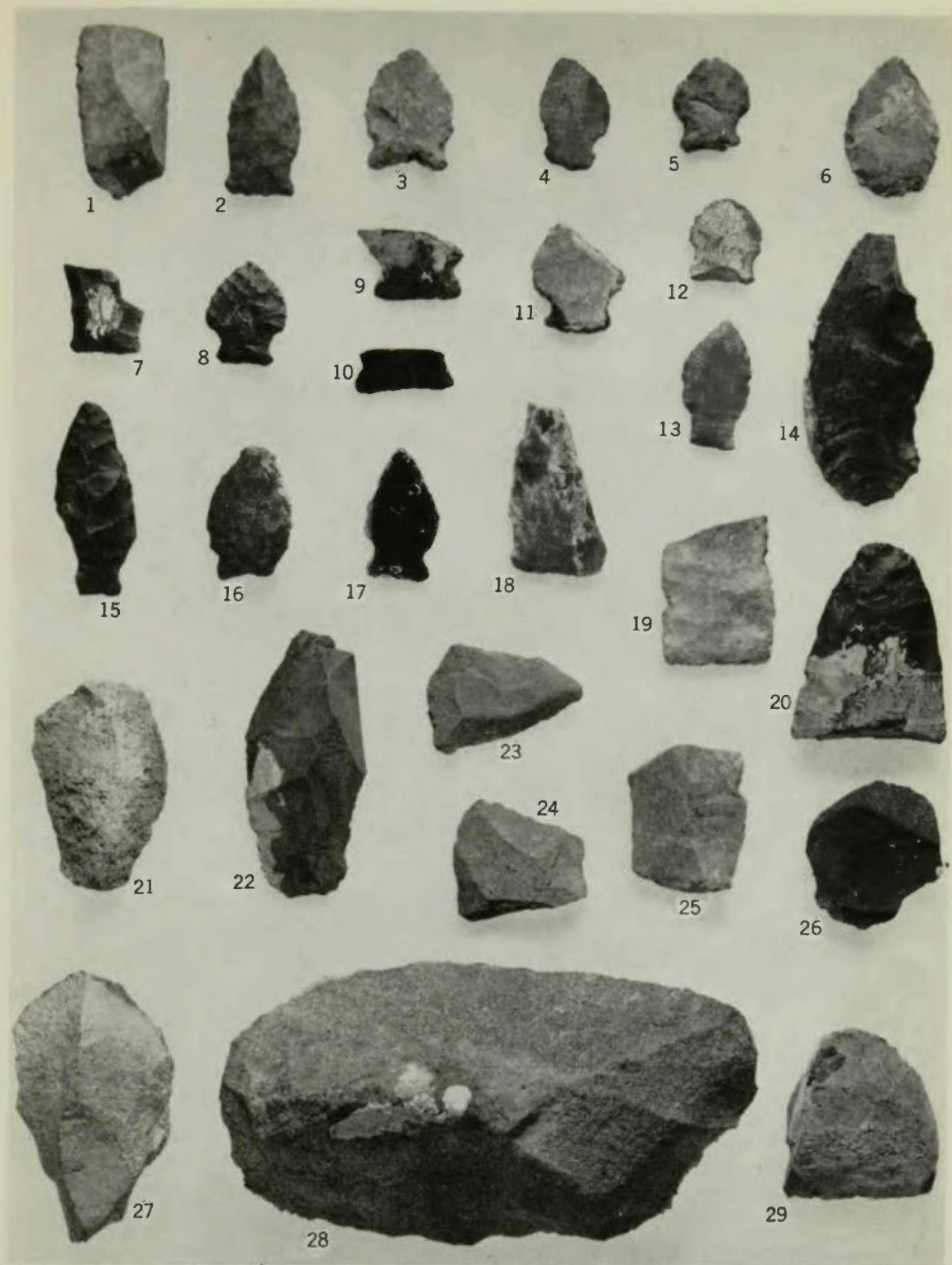
Pl. 2. Artifacts of the Kayuk complex. 1-7, typical Kayuk points; 8, transversely flaked point; 10, fluted point base; 9, 12-15, bifacial knives; 11, drill; 16, double-edged side scraper; 17, 18, snub-nosed end scrapers. 1-5, 7 to scale, length of 1, $2 \frac{5}{16}$ in.; 6, 10, 11 to scale, length of 6, $1 \frac{5}{8}$ in.; 8, 9, 12 to scale, length of 8, $2 \frac{1}{4}$ in.; 14, 16 to scale, length of 14, $4 \frac{5}{8}$ in.; 13, 15 to scale, length of 13, about 4 in.; 17, 18 to scale, length of 17, $2 \frac{1}{2}$ in.

Beyond the lagoon at Cape Krusenstern is the rather steep slope of a hill called Ingitkalik Mountain (Pl. 1). Few good camping places would have appeared on this shoreline before the beach ridges began to form and the ocean lay at the base of the mountain. Two benches, or small terraces, exist however. On the first of these, about 200 feet above sea level (Pl. 1, "E"), we found microblades and side blades like those of the Denbigh Flint complex, indicating that at a time before the beach ridges had begun to form, people had camped repeatedly on this steep hillside. These leavings might, of course, have been contemporary with the deposits on the Denbigh Flint complex beaches. A higher terrace, at the top of a colorful cliff that we call the Palisades (Pl. 1, "F"), provided a relatively flat area in which successions of people seem to have camped at widely separated time intervals. Here, on or just below the surface of eroded limestone, were found side-notched projectile points (Pl. 3, 2-5, 7-13, 15-17) of kinds distinct from those of Beach 53. Most of these points had concave bases, some of which were ground (Pl. 3, 7-10, 17), and all of them showed, except those of obsidian (Pl. 3, 17), both patination and lime encrustation derived from the local bedrock. Objects with about the same degree of patination include fragments of large bifaced knives or points (Pl. 3, 14, 18-20), and a few blades very similar to those produced by the Old World blade-and-core technique (Pl. 3, 1). Unlike any of these, however, were a number of relatively crude flakes and artifacts (Pl. 3, 21-9) which, according to geologists who visited this site, had once been chert like that of the remainder of the collection but had long since chemically changed throughout to a coarse, granular material. These artifacts include two axe-like objects (one is Pl. 3, 28) which show no hafting marks and might be easily held in the hand, and used flakes, some of which have been removed from the parent core by a technique resembling the Levallois. The bench upon which all of these artifacts are located has not been subjected to glacial action since Illinoian times at latest. Hence, any objects made by human beings and left on this site would have remained there indefinitely. Since the site is at the most southwestern point of the Brooks Range, where the mountains come nearest to the sea, it seems reasonable that this attractive lookout point would have been used, before beach ridges formed, as long as people walked the neighboring plains and hills.

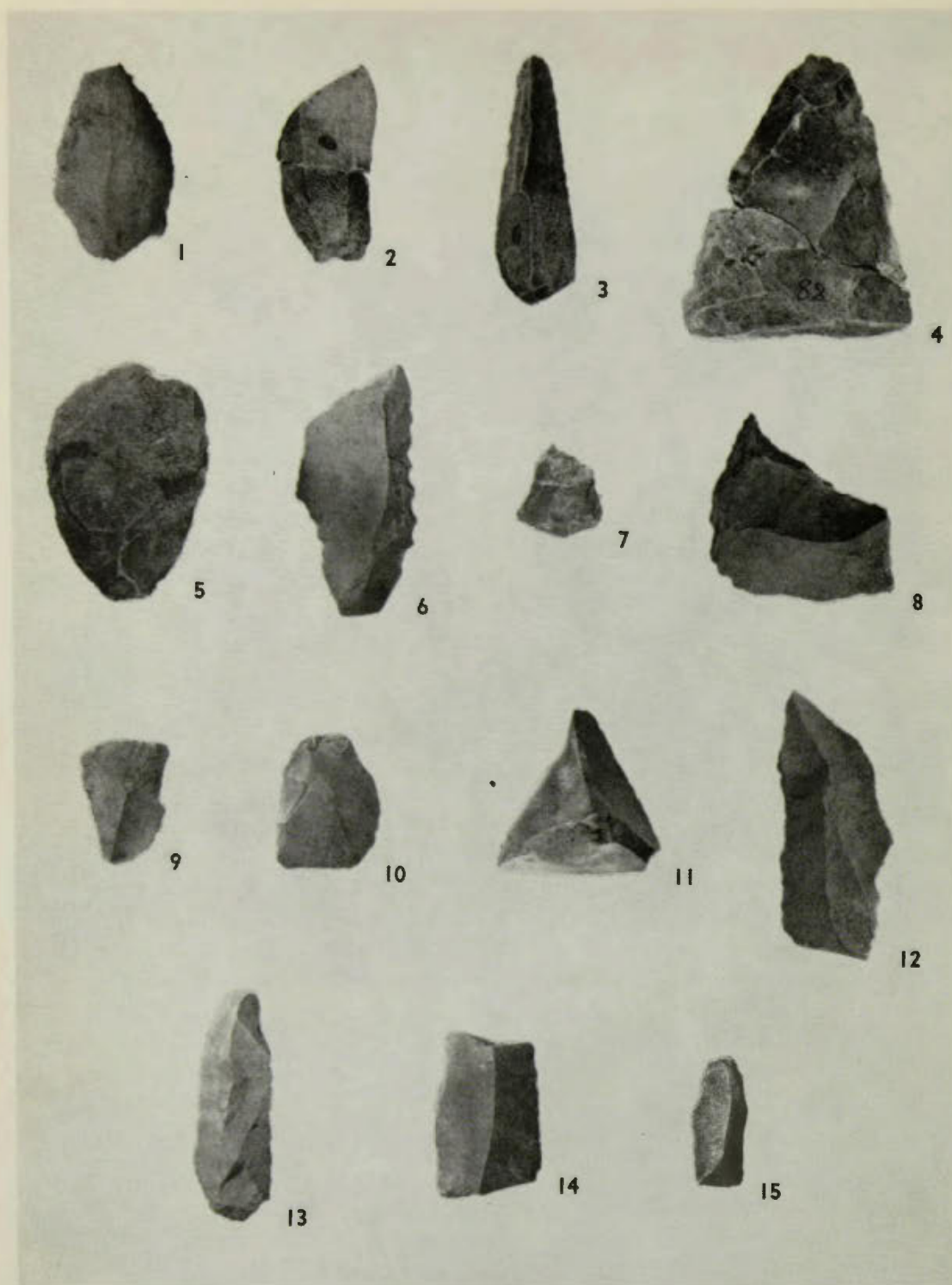
We thus have strong evidence of a succession of the beach ridges themselves and their included archaeology since some 6,000 or 5,000 years ago. An estimate of 5,500 years elapsed time, during which the ridges formed, would seem on present evidence to be reasonable and one which would also relate to the thermal maximum or postglacial optimum. The earlier dates attributed to the two mountainside sites is based in part on their relationship either to the earliest culture of the beach ridges or their failure, as in the Palisades site, to cross tie with anything previously known from the beaches of this or other regions about the Bering Strait. While it would be desirable to relate these firmly placed sequences, on the basis of typology, to far-away sites, we are inclined to proceed with caution. It is remembered, for example, that a notched point practically identical with one from the Palisades, was found in a house floor of the Upper Kobuk River dating to no more than 400 years ago. This object could, of course, have been a relic or keepsake for the people who built that house. Again, on a slightly earlier time level, house floors excavated at Onion Portage, also in the Upper Kobuk River valley, yielded three microblade cores and a microblade (Giddings, 1952b, p. 122, Pl. 46, 14-16, 19). A

microblade was also found in the floor of a 13th-century house at Ahteut (Giddings, 1952b, p. 73, Pl. 19, 9) on the Middle Kobuk River. These discoveries suggest the long persistence of very early techniques in the region inland from the shores of Kotzebue Sound, while none of the shore people had made use of these techniques for thousands of years. The notched points of the Palisades seem to resemble most closely those of the Denali Highway of southern Alaska, then points of the Tuktuk assemblage of Anaktuvuk Pass (Campbell, 1961b), and then the nearly modern points of the Southampton Island Sadlermiut of Hudson Bay. The time gradient is thus most difficult to assess with certainty. It is also recalled that the notched point horizon of Beach 53 had not been remotely anticipated on the basis of what was known of western Alaska archaeology, nor for that matter, had anyone predicted a culture like Ipiutak, of Point Hope, when it first came to light in 1939. It is tempting to relate the Palisades notched points to those of the eastern Archaic of the United States. Yet this tenuous cross-comparison can be made only after explaining the equally strong resemblance of some of the notched points of Beach 53 to some of the Old Copper flints of the Great Lakes region. It is far more desirable just now to work out the local relationships in the Bering Strait region between notched point and non-notched point horizons where they may be associated with well-rounded ways of life such as are manifest in the sites of coastal Alaska than to indulge in continent-wide comparisons of flints alone.

Some further thoughts are on a more local scale. There seems to have been a period of intensive whaling in western Alaska preceding the development of Choris, Norton, and Ipiutak cultures and resembling in intensity that of the Western Thule and later periods of the present millennium. The beach ridge sequence at Cape Krusenstern and elsewhere about Kotzebue Sound clearly shows also that Choris and Norton pottery and slate work preceded the long-existing and firmly established Ipiutak culture. The microblade and burin techniques do not appear in the notched point horizon of Beach 53, though thin traces of these techniques are present in the Choris culture. The microblade and burin appear to have faded rapidly after the deposition of Beach 80, or by an estimated 4,000 years ago at the latest. It is anticipated that the detailed studies in progress of microfossils and pollens in the succession of beach ridges at Cape Krusenstern, together with analysis of mammal bones, and other lines of investigation of this and the other remarkable beach ridge successions in western Alaska, will establish a firm, relative, and radiocarbon chronology to serve as a yardstick for Bering Strait cultural development.



Pl. 3. Patinated and encrusted flints, and chemically altered flints, from the Palisades site.



Pl. 1. Artifacts of the Kogruk complex. 1-3, points or end blades; 4, biface; 5, double-edged side scraper; 6, "saw"; 7, 8, graters; 9, 10, knife-like tools; 11, remnant flake-core; 12-15, blades and microblades. 1-8, 11, 13, 14 to scale, length of 1, 2 in.; 9, 10, 12, 15 to scale, length of 9, 14 in.

CULTURAL SUCCESSION AT ANAKTUVUK PASS, ARCTIC ALASKA

John M. Campbell

Nothing was known of the prehistory of the higher reaches of the Brooks Range of arctic Alaska until 1950. In that year, and in 1951, small but important artifact series were collected at a few scattered localities in valleys and passes in the central and western parts of those mountains. Among the most impressive of the pioneering finds were those of William N. Irving and Robert J. Hackman in and about Anaktuvuk Pass (the summit of which lies at $68^{\circ}8'N.$, $151^{\circ}43'W.$). Irving, the first man to attempt systematic prehistory investigations in the central Brooks Range, examined and recorded about eleven archaeological sites within the boundaries of the pass during two seasons, and excavated two of them. His several sites represented at least three distinct archaeological components, including a late Eskimo horizon, a Denbigh Flint complex component (from a single site, "Imaigenik"), and a puzzling complex (also from one site, "Tuluak"), the implements of which, according to Irving, somewhat resemble Denbigh Flint complex artifacts, but which also show similarities to Ipiutak, Pearyland Dorset, and west Greenland Paleo-Eskimo cultures (Irving, 1951; 1953). Robert J. Hackman together with George Gryc, geologists, found two sites at Natvakruak (Narivukararuk) Lake 15 miles north of the summit of the pass in 1950. One of them contained quite recent cultural remains (presumably those of Brooks Range Eskimos), and the other yielded implements that are akin to type artifacts of the Denbigh Flint complex (Solecki, 1951; Solecki and Hackman, 1951).

In the summer of 1956 the late Donald G. MacVicar, Jr. of Yale University invited me to join his geological field party at Chandler Lake about 30 air miles west of Anaktuvuk Pass. During that and the following three seasons I surveyed and excavated at Chandler Lake, in and about Anaktuvuk Pass, and in the valley of the John River, a stream that rises in the pass and drains south to the Koyukuk River. The work of those four seasons (1956-9) added 28 sites and six cultural components to the known archaeology of the Anaktuvuk region.¹

¹For these studies I am first indebted to Donald G. MacVicar, that fine scholar, who died at Chandler Lake in the summer of 1956. I shall not list here the numerous other men who, at home and in the field, have given me valuable assistance. Support of this research was provided by the Arctic Institute of North America; the Office of Naval Research, United States Navy; the Department of Anthropology, Yale University; and the Peabody Museum of Natural History, Yale University.

The sites

I have previously sketched the climate and physiography of the region about Anaktuvuk Pass (Campbell, 1959), and I shall not repeat those descriptions here. But it is appropriate to say that north of the tree-line in those desertic mountains old habitation sites occur typically, if not exclusively, on the relatively level and dry surfaces of glacial terrain features (primarily kames, kame terraces, and moraines) lying on the floors and low along the sides of ice sculptured valleys. And through time, at least since the melting of the last major glaciation in the Anaktuvuk region, the men who have lived there have pitched their camps on particular portions of the same or similar glacial features according primarily to specific criteria of season, nearness to routes of travel of caribou or other herding species of large game, points of vantage, availability of water and fuel, drainage factors, and availability of fish. Thus, while there is considerable variety represented in the Anaktuvuk archaeological record, there is a telling regional consistency in settlement patterns, a consistency that very probably spans at least 8,000 or 10,000 years. Once I had become aware of the long persistent local patterns of settlement, as reflected archaeologically (and also in the present encampments of the caribou hunting Nunamiut Eskimos), and had analysed the ecological factors involved, my assistants and I were able to narrow the search for habitation sites to a relatively few terrain localities in an area containing hundreds of square miles.

Nearly all habitation sites in and about Anaktuvuk Pass are characterized by a thin veneer of dense tundra sod which covers the cultural debris. That sod is usually no more than two or three inches thick, but at most sites it has effectively sealed off and protected the archaeological remains. Also characteristic of most Anaktuvuk dwelling sites is their shallow depth, and lack of vertical stratigraphy. I have rarely found artifacts or associated features at depths greater than 12 inches below the present ground surface, nor have I discovered in the region the remains of one culture clearly superimposed on that of another (Irving, 1953, pp. 66-8, found one stratified site consisting of two distinctive components just within the northern mouth of the pass). For want of vertical stratigraphy I have constructed the following chronology primarily on the basis of typological comparisons of Anaktuvuk artifacts with those from other sites in North America and Eurasia. Geological provenience of artifacts, and the presence or absence of organic remains in the sites have also been used in estimating the relative temporal positions of some of the Anaktuvuk cultures or complexes. A radiocarbon date from one of the sites is useless for my purposes here, as I shall presently explain.

Since Irving (1953, pp. 66-74) has previously described and interpreted his Anaktuvuk Pass Tuluak complex, and I have not examined the Tuluak artifacts, that component is not included here. Tuluak, however, must be considered as an additional, distinctive complex in the Anaktuvuk sequence, and I accept Irving's conclusions that in time it probably stands somewhere between the Denbigh Flint complex and the Ipiutak culture, and that it is a member of the same continuum to which both Denbigh and Ipiutak belong.

In the summer of 1961, I discovered two more distinctive complexes at Anaktuvuk, the artifacts of which have not yet been analysed. One of the two is early, and possibly relates to certain Paleolithic Eurasian industries.

The other appears to be quite directly related to both Denbigh and Ipiutak and quite likely represents a developmental link between the two. It also seems to be closely allied with Tuluak.

The sequence: a chronological summary

The Kogruk complex: At the base of the Anaktuvuk culture-time scale, the Kogruk complex (Campbell, 1961a) consists of 572 rude stone artifacts (Pl. 1) recovered from 2 to 12 inches below the present ground surface in a kame terrace at the summit of Anaktuvuk Pass. There were no architectural features in association. Almost all of the artifacts in this homogeneous series are rather large, thin, angular flakes of light gray chert struck from roughly prepared, irregularly shaped cores. Somewhat less than half of the Kogruk specimens are unretouched, unused flakes and 10 specimens are remnant flake-cores (Pl. 1, 11), thick, relatively massive flakes from which smaller flakes (implement "blanks") were struck. Tools included in the remainder of the collection (284 specimens) include 4 probable points or end blades (Pl. 1, 1-3); 2 bifaces (Pl. 1, 4); 1 double-edged side scraper (Pl. 1, 5); 1 "saw" (Pl. 1, 6); 3 gravers (Pl. 1, 7, 8); 250 knife-like implements (Pl. 1, 9, 10); 21 blades and microblades (Pl. 1, 12-15), some of which have been retouched to serve as knives, and one of which (Pl. 1, 2) is included in the point or end blade category above; and, 3 choppers fashioned from flake-core remnants. While unquestionably implements, a large percentage of the artifacts contained in the tool type categories above differ from the many unretouched, unused flakes, only in having use scars, and not many of the Kogruk specimens fit distinctive, easily recognizable implement types. Therefore, while more than one-half of the artifacts in the total series was obviously put to use, most of them may be fairly characterized as "tools of the moment".

On the basis of both geological evidence and cultural comparisons Kogruk appears to be quite definitely the earliest Anaktuvuk complex yet discovered. I have previously explained, on the basis of geological evidence, why I believe that the Kogruk implements were deposited during or just following the melting of the last major glacier at Anaktuvuk Pass (Campbell, 1961a, pp. 6, 7, 13, 14). And while the age of that glacier (the Echooka) is still in doubt (Detterman, Bowsher and Dutro, 1958; Porter, 1959), it is probably 8,000 to 10,000 years old, if not older. Culturally, Kogruk has only one close tie in the Americas, the old British Mountain phase of MacNeish's Firth River sequence which he has estimated to have an antiquity of about 9,000 years (MacNeish, 1959b, chart). I think Kogruk is rather closely allied with British Mountain although the latter tool inventory is more sophisticated. Kogruk also appears related in several ways to the earliest levels of the Mal'ta site near Lake Baikal (Bonch-Osmolovsky and Gromov, 1936) and also to Siberian Paleolithic sites in the upper Lena River valley (Okladnikov, 1953). Even more interesting are the resemblances of specific Kogruk artifacts as well as Kogruk implement-making techniques to the European Paleolithic. There is a pronounced Mousterian quality about a number of Kogruk specimens, and several Kogruk implements appear nearly identical to artifacts from the Levalloiso-Mousterian level in Et-Tabun Cave at Mount Carmel (Garrod and Bate, 1937). While I do not know what the close resemblances between this old Alaskan complex and Paleolithic Europe will

eventually come to mean, I am not surprised that the Kogruk complex implies early, rather direct relationships between North America, northern Asia, and Europe as well.

The Kayuk complex: Since first describing the Kayuk complex (Campbell, 1959), I have modified my preliminary estimate of the meaning of the site and its contents in terms of the cultural components represented. The following summary, and the discussion in this paper relative to the Anaktuvuk Ipiutak component, explains my present point of view and redefines Kayuk as I now see it.

The unstratified Kayuk site extends discontinuously for more than one-fourth of a mile along the top of the same kame terrace from which the Kogruk collection was recovered. During the 1956 and 1957 seasons slightly more than 2,400 artifacts (the great majority of which are unretouched or only slightly retouched stone flakes) were recovered at depths ranging from sod root level to a maximum of 12 inches below the present ground surface. Artifacts were concentrated in four areas within the larger boundaries of the site. Most of the more than 400 well-fashioned implements of stone recovered during those first two seasons represent a previously undescribed complex, the hallmark of which is a lanceolate, obliquely flaked projectile point. A few stone, antler, and bone implements, however, from two of the four areas of artifact concentration, very closely resemble type artifacts of the Ipiutak culture (Larsen and Rainey, 1948). Because of the lack of stratigraphy at Kayuk, and because the Ipiutak-like and "Kayuk proper" specimens were mixed together vertically, I originally concluded that all or nearly all of the artifacts from the site represented one complex, although, at the same time, I believed that there was "... a fairly good possibility that those implements, so much akin to Ipiutak in form, [were] intrusive among the remains of an older culture." (Campbell, 1959, p. 104). Further brief examinations of the Kayuk site in 1958 and 1959, and the collection of additional artifacts from the two areas of concentration within the site from which the Ipiutak-like specimens were originally recovered has led me to think, on the basis of the horizontal distribution of artifacts, that there is an intrusive complex present. The present discussion will accordingly treat the Kayuk complex proper, and I shall subsequently describe what I have termed the "Anaktuvuk Ipiutak component".

An oval hearth, measuring 42 by 24 inches horizontally, and containing 40 stream cobbles laid together to form a solid, closely packed layer, was the only structural feature in the Kayuk site indisputably associated with the complex.¹ Basal portions of two typical Kayuk projectile points were discovered in crevices among the lowermost stones of that fireplace at a depth of six inches below the present ground surface. No remains of houses or other architectural features were found, but each of the four sub-areas within the site contained, along with stone tools and abundant flakes, greasy humus, bits of charcoal, and other earth staining that testified to a rather intensive, if not lengthy occupation.

¹One other hearth was possibly associated with the Kayuk complex. A third hearth, from which a sample yielded a modern radiocarbon date (Stuiver, Deevey, and Gralenski, 1960, p. 56), was obviously intrusive. A fourth feature in the Kayuk site, a large lens of fine, gray ash, contained numerous implements akin to Ipiutak type specimens, and I now consider that feature to belong with the Anaktuvuk Ipiutak component.

Typical Kayuk implements are of chalcedony, and most of the artifacts of that material are dark gray or nearly black, but some are very light gray, a few almost white, and there are brown and green specimens as well. This wide color range implies that the materials were quarried from different, probably widely scattered, deposits in the Brooks Range. A further implication is that the men of the Kayuk complex were well acquainted with the stone resources of the mountains and thus, in all probability, were well-established residents of the Brooks Range and not merely travelers or emigrants through the mountains. A few Kayuk implements were manufactured from chert and about 3 per cent of the total collection is obsidian implements or spalls. The origin of the Anaktuvuk Pass obsidian, which occurs in small quantities in nearly every component, is at present unknown. It was carried to the Anaktuvuk area in pebble form, and I am increasingly inclined to think that there are deposits of that material somewhere in the Brooks Range.

As noted above, the most outstanding Kayuk implement is the lanceolate, obliquely flaked Kayuk projectile point (Pl. 2, 1-7), nearly 200 of which have been collected from the site. Most are quite large, complete examples ranging from $2\frac{1}{8}$ inches to $4\frac{7}{8}$ inches in length. Except for 3 obsidian point bases, none are edge ground. In most instances fine, oblique flaking was accomplished by removing small flakes from both edges, although flake scars extend completely across the faces of some Kayuk points. Bases are nearly without exception convex in outline, sides are parallel or only slightly expanded, and in lateral cross-section Kayuk points range from thick oval to diamond shape. Two points in the collection are flaked transversely, rather than obliquely (Pl. 2, 8) and 4 points are roughly made, appear heavily patinated and except for general shape, are quite unlike the rest of the series. Extensive basal thinning occurs on about 8 per cent of the Kayuk points, and one specimen (Pl. 2, 10) was basally fluted by the removal of broad vertical flakes from both faces.

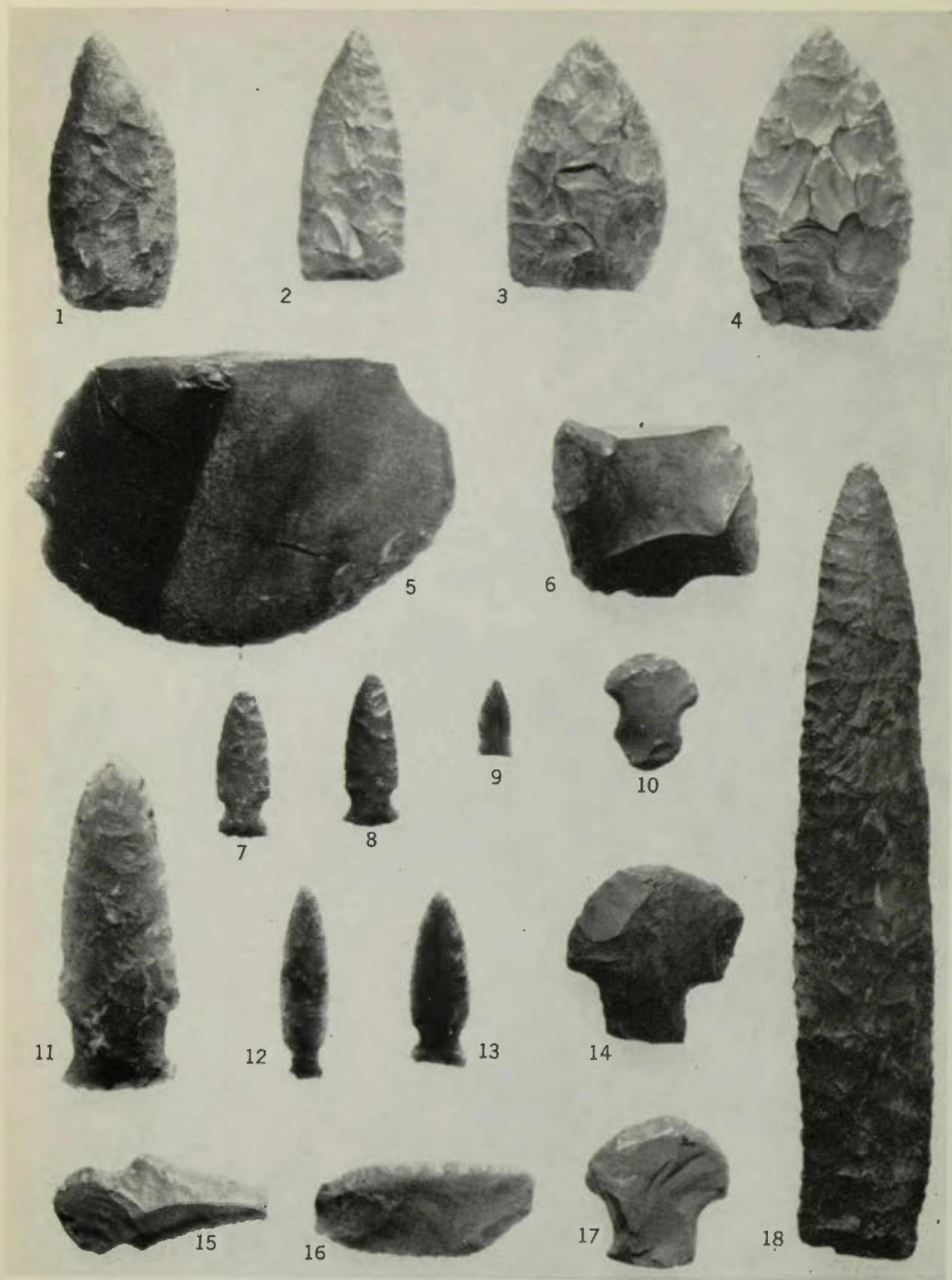
There are about 150 angular bifaces in the Kayuk collection (Pl. 2, 9, 12-15), some of which (Pl. 2, 9, 12, 13) show on one or both faces the characteristic oblique flaking of typical Kayuk points. Kayuk bifaces also tend to be large, the longest complete specimen (Pl. 2, 14) measuring $4\frac{3}{8}$ inches in length. Nearly all were probably used as knives, although a few of the small specimens (Pl. 2, 9) may be points or end blades. Twenty-nine scrapers are represented by relatively large end scrapers of various types, including a few nearly keeled examples and more typically rather triangular snub-nosed forms (Pl. 2, 17, 18). A few Kayuk scrapers are worked along more than one edge, and there is a single large double-edged side scraper (Pl. 2, 16), which again shows the typical Kayuk flaking technique.

Four fragmentary drills (Pl. 2, 11), 4 angle burins, one of which is trimmed on two edges, 2 microblades, 2 micro-cores, and several large blades complete the Kayuk assemblage. The drills are obliquely flaked in the Kayuk manner and, in all probability, belong to the complex. I think, however, that the burins, microblades, micro-cores, and large blades are possibly intrusive, since usually those implement types are numerically more common relative to other tool types in arctic cultural components in which they occur and especially since several other nearby Anaktuvuk archaeological sites representing other complexes contain burins, blades, and particularly microblades in comparative abundance. At present, there is nothing approaching an absolute date for the

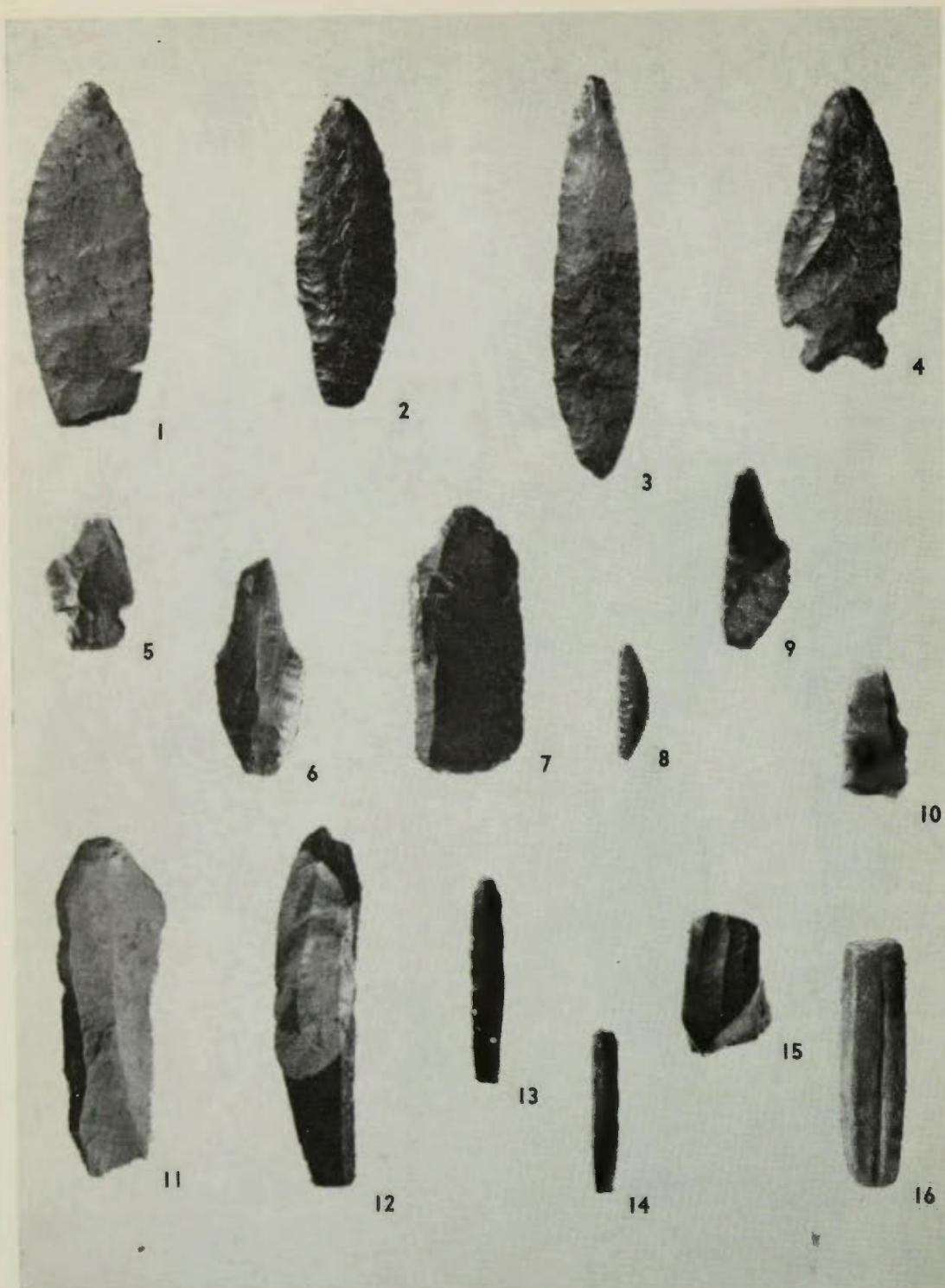
age of the Kayuk complex. However, the very large series of Kayuk projectile points, together with other Kayuk implements, allow comparisons with other North American lanceolate point industries. In many respects, Kayuk points closely approximate early leaf-shaped points from the Great Plains, particularly those of the Angostura assemblage (Hughes, 1949, pp. 270-4) and, in the north, large leaf-shaped points and other types of bifaces from a number of relatively old sites in Alaska, Yukon Territory, and the Northwest Territories appear to be related to Kayuk artifacts. I think that there is good reason to place the Kayuk complex within the Plano, formerly "Yuma", continuum and, on the basis of that relationship, assign Kayuk an age of 5,000 to 7,000 years (see MacNeish, 1959a,b, for discussions of some northern relatives of the Kayuk complex).

The Natvakruak complex: The Natvakruak series consists of about 200 chert and chalcedony (of several colors), obsidian, and sandstone artifacts which I collected from one of two sites at Natvakruak Lake, 15 air miles north of the summit of Anaktuvuk Pass, originally described by Solecki (1951) and Solecki and Hackman (1951). The site extended discontinuously over portions of a rocky peninsula which juts about 400 yards into the lake. No structural features were discovered. A few Natvakruak artifacts were found on the surface in small areas of exposed gravel. Most, however, were recovered below the thin sod to a maximum depth of slightly more than 15 inches. The collection contains 6 finely flaked, leaf-shaped points or end blades, flat lenticular in lateral cross-section (Pl. 3, 1-3); 1 stemmed and 2 side-notched points (Pl. 3, 4, 5), not as well flaked as the lanceolate examples; 5 flaked side blades (Pl. 3, 8); 13 scrapers, including end and end-and-side types (Pl. 3, 7), and a distinctive stemmed form (Pl. 3, 6); 3 burins (Pl. 3, 9, 10); 4 burin spalls; 1 possible flake graver; 4 blades (Pl. 3, 11, 12); 31 microblades (Pl. 3, 13, 14); 1 micro-core (Pl. 3, 15); 4 abraded sandstone implements (Pl. 3, 16); 14 bifaces (knife-like implements); and 104 chert and chalcedony flakes, some of which have use or retouch scars. Eight fragments of unworked antler were found beneath the sod in one small portion of the site. I include in the Natvakruak complex a long, thin, finely flaked point (Pl. 3, 3) which was found by an Eskimo at the entrance to a rodent burrow, 4 miles south-southeast of the Natvakruak site.

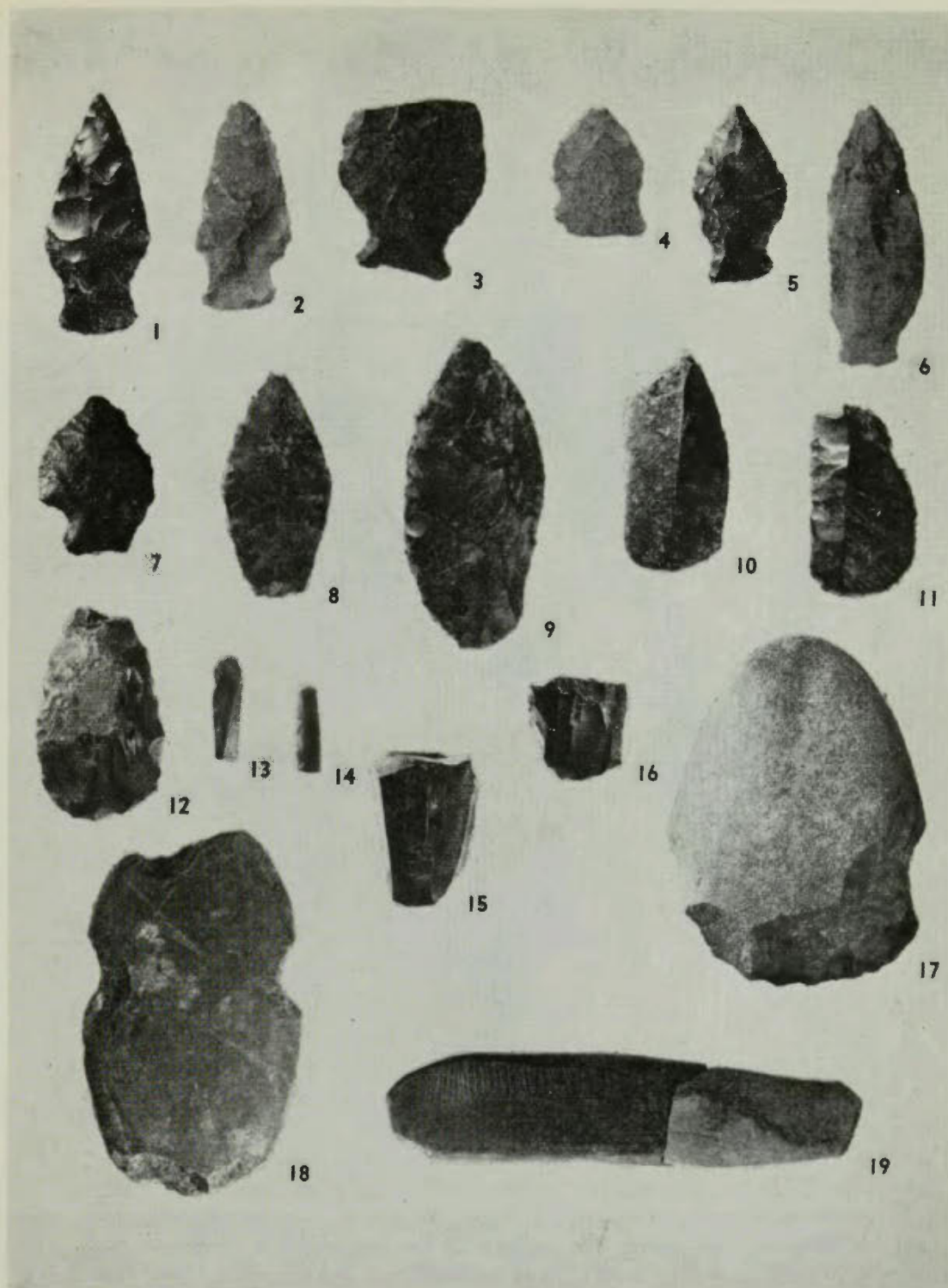
Except for the notched points from Natvakruak, one of which (Pl. 3, 4) was found beneath the sod in direct association with one of the burins and one of the lanceolate points, the artifacts are very similar to Denbigh Flint complex artifacts from the Cape Denbigh type site and, in fact, Natvakruak burins, blades, microblades, and side blades are nearly identical to Denbigh Flint complex type specimens. I agree generally with the conclusions of Solecki (1951, p. 51), and Solecki and Hackman (1951) that the Natvakruak site represents an inland Denbigh Flint complex manifestation, as does the nearby Anaktuvuk Pass Imaigenik site excavated by Irving (1953, pp. 60-5). The stemmed and notched points in Natvakruak may be intrusive. On the other hand, they may stand for a specific, as yet undefined, development or change in the Denbigh continuum. In any event, I think it most probable that the age of the Natvakruak complex lies somewhere in the Denbigh Flint complex time range of probably 4,000 to 6,000 years ago.



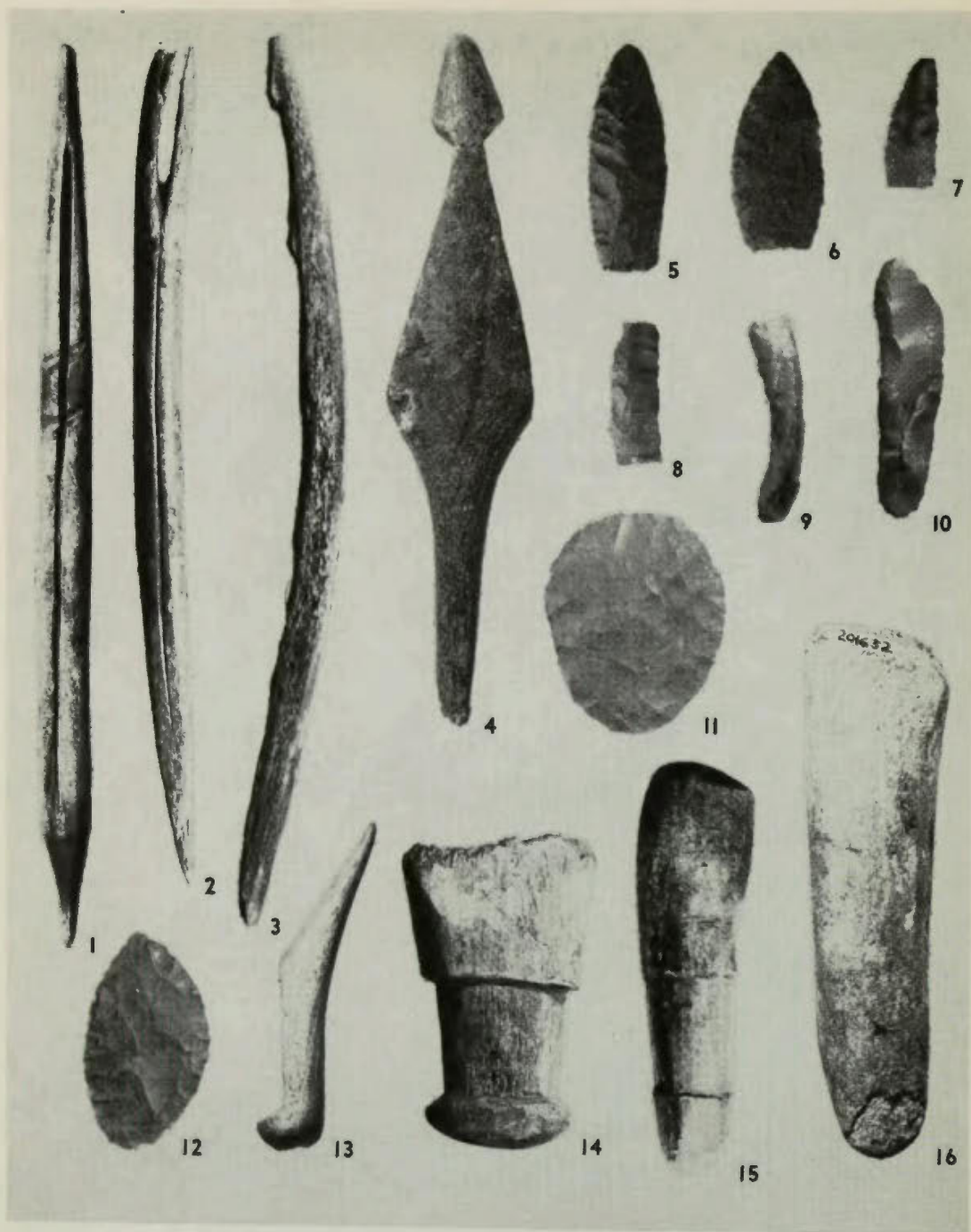
Pl. 2. Flints from a house excavation on Beach 53; whaling harpoon (?) points; ulu; adze head; projectile points; scrapers; and knives or lance blades.



Pl. 3. Artifacts of the Natvakruak complex. 1-3, lanceolate points or end blades; 4, 5, side-notched points; 6, stemmed scraper; 7, end-and-side scraper; 8, side blade; 9, 10, burins; 11, 12, blades; 13, 14, microblades; 15, micro-core; 16, ground sandstone implement. 1-7, 9-15 to scale, length of 1, $3\frac{7}{8}$ in.; 8, 16 to scale, length of 8, $1\frac{3}{16}$ in.



Pl. 4. Artifacts of the Tuktuk complex. 1-4, notched points; 5-7, asymmetrical notched end blades; 8, leaf-shaped point; 9, bifacial knife; 10, blade end scraper; 11, blade end-and-side scraper; 12, steeped scraper; 13, 14, microblades; 15, 16, micro-cores; 17, 18, sandstone, pebble hafted axes; 19, ground micaceous schist implement. 1-8 to scale, length of 1, 2 1/4 in.; 9, 17-19, to scale, length of 9, 3 7/16 in.; 10-16 to scale, length of 10, 2 1/4 in.



Pl. 5. Artifacts of the Anaktuvuk Ipiutak component. 1, 2, slotted arrowheads; 3, leister prong; 4, fish spear center prong; 5, 6, end blades; 7, 8, side blades; 9, 10 side scrapers; 11, 12, bifaces; 13, fish spear barb; 14, adze head; 15, flint hammer head; 16, wedge. 1, 2, 4, 13 to scale, length of 1, 5 3/4 in.; length of 3, 7 1/4 in.; 5-8 to scale, length of 5, 1 5/8 in.; 9-12 to scale, length of 9, 2 5/8 in.; 14-16 to scale, length of 14, 2 7/8 in.

The Tuktu complex: Tuktu (Campbell, 1961b) is one of the most distinctive Anaktuvuk components, one of the largest in terms of the number of artifacts recovered, and one of the few which contains architectural features. The Tuktu site extends for nearly 350 feet north and south along the top of a kame terrace, 4 miles northeast of the summit of the pass. Like most Anaktuvuk sites, the site area was overlaid with a dense but thin tundra sod, and the first Tuktu artifacts were discovered by digging test pits through that cover.

Artifacts, which lay beneath the sod to a maximum depth of 8 inches, were concentrated in five parts of the total site area, and in each instance at least one hearth occurred in direct association with the scattered implements. A single summer house, nearly circular, measuring 12 by 10 feet in diameter and having an east-facing entrance, was also discovered in one of the five areas of artifact concentration. It was clearly marked around its perimeter by stream-worn cobbles, some of which protruded through the sod, and with it were associated three hearths; a small charcoal lens in its center, another similar lens directly in the doorway (in all probability a mosquito smudge), and a large cobbled fireplace 9 feet east and directly in front of the door. The dwelling was very likely originally hemispherical and hide-covered; it contained numerous typical Tuktu artifacts, and many more were discovered directly outside of its perimeter, particularly between the entrance and the exterior cooking hearth.

All of the 1,529 Tuktu artifacts are of stone and most of the total series consists of unretouched flakes. There are 88 specimens of obsidian in the collection, including 8 implements and 80 un-retouched flakes; 8 artifacts of sandstone; 2 of micaceous schist; 1 of quartzite; 1 of felsite; and 1 unworked fragment of quartz crystal. The remaining Tuktu artifacts are of chert or chalcedony, and, as in the Kayuk and Natvakruak series, the color range implies a knowledge of the locations of widely scattered quarry sites and, consequently, extended residency in the mountains.

Tuktu implement types include 31 projectile points (Pl. 4, 1-4, 8); 4 asymmetrical notched end blades (Pl. 4, 5-7); 1 flaked side blade; 42 large bifaces (Pl. 4, 9); 96 scrapers of several forms (Pl. 4, 10-12); 21 blades; 59 microblades (Pl. 4, 13, 14); 9 micro-cores (Pl. 4, 15, 16); 2 pebble hafted axes (Pl. 4, 17, 18); 1 pebble chopper; 6 pebble sinkers; and 2 ground or rubbed implements of problematical use (Pl. 4, 19).

The notched points and notched end blades (Pl. 4, 1-7) perhaps most outstandingly set the Tuktu complex apart from other known Anaktuvuk Pass archaeological components. But perhaps even greater distinctiveness is reflected in the total combination of Tuktu artifact types and implement manufacturing techniques. The notched points, notched end blades, and the side blade occur together with abundant, very well fashioned blades and microblades, many bifaces, and a very large number of scrapers. Stone grinding or rubbing is present on only a few Tuktu specimens, but in addition to the two micaceous schist implements previously noted, there is stone abrading on a few of the pebble artifacts as, for example, in the side notches of the two pebble hafted axes (Pl. 4, 17, 18). The types of implements then, their relative occurrences in the collection, and the well-developed pressure flaking, blade making, and stone grinding techniques represented, set Tuktu apart. While Tuktu cannot at present be very directly equated with reported finds from other localities,

comparisons of Tuktu implement types with similar artifacts from northern complexes permit the establishment of tentative relationships between Tuktu and a few other known North American arctic and subarctic complexes. I think there is a connection between Tuktu and the Lockhart River complex of the Artillery Lake region (MacNeish, 1951), the Ratekin site in west central Alaska (Skarland and Keim, 1958), and the Palisades assemblage from Cape Krusenstern (Giddings, 1962¹). There are other possibly related complexes in far northern North America, but on the basis of the available literature the three mentioned above appear to be those most probably allied with Tuktu.

Tuktu samples for radiocarbon analysis have not yet been measured and at present any discussion of the age of the site must necessarily be a speculative one. Since all Tuktu implements of organic materials have perished from the site, and since Ipiutak bone and antler artifacts (see following discussion) were recovered from apparently identical soils in a similar kame terrace 4 miles from the Tuktu site, it would appear that Tuktu predates the Anaktuvuk Ipiutak component and thus has a minimum age of 1,500 to 2,000 years. Estimated dates for the probably related Lockhart River, Ratekin, and Palisades components are 1,000 to 4,000 years (MacNeish, 1951, p. 33), 2,000 to 4,000 or more years (Skarland and Keim, 1958, p. 81), and 5,000 or 6,000 years (Giddings, 1962) respectively. I am inclined to think that the Tuktu complex is 3,000 or 4,000 years old, although this is admittedly a guess. Meanwhile, regardless of how old Tuktu will eventually prove to be, it apparently belongs to an early, northern notched point tradition that ranged widely in time and space, and that was adapted to boreal forest, high tundra, and littoral environments.

The Toyuk complex: The small series of implements representing Toyuk were discovered just beneath the surface along the top of an alluvial terrace between Hunt Fork and the John River about 4 miles above the confluence of those streams and approximately 30 air miles south-southwest of the summit of Anaktuvuk Pass. Toyuk is the only component in the Anaktuvuk sequence that was discovered within the boreal forest zone. An open stand of mature spruce covers the site area, and some of the Toyuk artifacts were found under the roots of the trees as well as under dead, fire-killed spruce stumps that apparently stood on the site before the seeding of the present forest cover.

The 218 stone specimens in the Toyuk collection include the base of a large, nicely flaked stemmed point or end blade of obsidian (Pl. 6, 10); 1 obsidian, flake end scraper (Pl. 6, 11); 1 chert fragment from which a burin spall was apparently struck (Pl. 6, 14); 8 chert microblades (Pl. 6, 15-18); 1 abraded flat sandstone cobble, probably a chopper or digging implement; 1 large, chert cobble chopper; 1 split chert cobble; 195 chert flakes, a few of which show retouch or use scars (Pl. 6, 12); and 9 unworked obsidian flakes (Pl. 6, 13). Nearly all of the chert is dull black in color and occurs abundantly in cobble form in the stream bed of the nearby John River. As previously noted, the source of Anaktuvuk Pass obsidian which was brought into the area in cobble or pebble form is at present unknown.

The impoverished Toyuk collection does not permit any but the most general and conjectural statements concerning the age and cultural affinities

¹All 1962 dates refer to papers in this volume.

of the complex. Except for the single, well-made point or end blade, Toyuk implements, including microblades and the single flake scraper, are relatively rude. The evidence of blade and burin techniques, and the presence of nearly unmodified flake tools, along with the rude chopping implements, might lead one to place the Toyuk complex within that early continuum represented by the British Mountain phase of the Firth River sequence (MacNeish, 1956a) and by the Kogruk complex of Anaktuvuk Pass. The single, well-fashioned stemmed point or end blade, however, belies direct relationship with either. Perhaps Toyuk belongs somewhere in the tradition represented by the Tuktu complex and its affiliates, although except for the notched point and the microblades Toyuk contains nothing that specifically relates to Tuktu.

Because of both the previously noted characteristics of the implements and the absence of organic remains in the site, I am led to think that the Toyuk complex is of respectable antiquity. The lack of non-lithic artifacts may testify to the irregular occurrence of forest fires. I think it improbable, however, that such materials, formerly in association with the stone artifacts recovered, were consumed by the prehistoric conflagration that left the charred stumps which still remain on the Toyuk site, since the stone specimens appear to have been well covered with soil before that last fire. Therefore, while only the most tenuous conclusions may be advanced concerning the age and cultural relationship of Toyuk, I am presently placing this puzzling complex below the Anaktuvuk Ipiutak component in the Anaktuvuk chronology. We may someday have more clues with which to assign Toyuk its place in that long portion of the sequence that extends beyond 2,000 years ago.

The Anaktuvuk Ipiutak component: Stone, antler, and bone implements of this complex (Pl. 5) were recovered from two of the four major areas of artifact concentration in the Kayuk site (see above). There are 611 specimens in the total collection, 475 of which are mammal teeth or unworked fragments of antler or bone. The remainder of the collection consists of 47 stone and 89 antler or bone implements. Easily identifiable antler or bone specimens include 2 harpoon heads; 5 arrowheads (Pl. 5, 1, 2); 1 leister prong (Pl. 5, 3); 1 fish spear center prong (Pl. 5, 4); 5 fish spear barbs (Pl. 5, 13); 3 adze heads (Pl. 5, 14); 2 flint hammer heads (Pl. 5, 15); 1 wedge (Pl. 5, 16); 1 ice pick; 3 awls or punching implements; 2 "pins", needle-like objects which are not eyed; 1 bird bone fragment from which needles were cut, and 1 well-finished artifact decorated with incised lines. There are, in addition, 61 drilled, cut, or incised antler or bone fragments.

While nearly all recognizable implements of antler or bone from the Kayuk site may be typologically equated with implements of the same materials from the Ipiutak type site at Point Hope, Alaska (Larsen and Rainey, 1948), it is more difficult to isolate Ipiutak artifacts of stone from the large series of Kayuk complex stone implements. Although, as previously noted, Anaktuvuk Ipiutak specimens were concentrated in only two areas of the Kayuk site, it should be remembered that typical Kayuk complex artifacts of stone occurred in direct, or nearly direct, association with the Ipiutak materials. I have accordingly assigned to the Anaktuvuk Ipiutak component only those stone artifacts which appear nearly identical to specimens from the Ipiutak type site. Included are: 14 end blades (Pl. 5, 5, 6); 13 side blades (Pl. 5, 7, 8); 12 discoidal or ovate

bifaces, some of which may represent adze blades or large side blades (Pl. 5, 11, 12); and 8 elongate side scrapers (Pl. 5, 9, 10). All of the chipped stone specimens are of chert or chalcedony of various colors.

Certain hazards are admittedly faced in separating those implements from the unstratified Kayuk site, which I have equated with Ipiutak culture, from those which belong to the previously unknown Kayuk complex. There are two major reasons, however, why I think my present evaluation concerning the presence of two distinctive cultures in the Kayuk site is correct. First, implements of organic materials were found in only two small areas of the site. Second, those implements in almost every instance are identical or nearly identical to Ipiutak type artifacts of the same materials, and with them at Kayuk occurred end blades, side blades, bifaces, and other tools of stone that also have their direct equivalents in the Point Hope Ipiutak collection. While typical Kayuk complex artifacts, particularly the distinctive Kayuk lanceolate points, were associated with the stone, antler, and bone remains just mentioned, Kayuk points and other Kayuk complex implements of stone occurred abundantly in all four areas of artifact concentration including two areas from which non-lithic artifacts and typical Ipiutak stone artifacts were lacking. The very high probability of an Ipiutak intrusion in the old Kayuk site is thus implied. Further, while Kayuk complex implements from the site relate generally, and in some instances specifically, to the early lanceolate point industries mentioned in my discussion of the Kayuk complex, the Ipiutak-like implements relate directly to Ipiutak culture. And, even if one argues that some of the artifacts that I have assigned to the Anaktuvuk Ipiutak component may belong just as well in other northern cultures, as for example, Birnirk or near-Ipiutak, there is no evidence from anywhere in the Arctic or Subarctic that leads one to think that all of the artifacts from the Kayuk site should logically belong together in one cultural manifestation that marks a part of, or a developmental link in, any known tradition or cultural continuum. I therefore think that what I have termed the Anaktuvuk Ipiutak component must be considered apart from the Kayuk complex and that it is logical to assume that it belongs with, or very close to, classic Ipiutak both culturally and temporally. The Anaktuvuk Ipiutak component should have an age of approximately 1,500 to 2,000 years.

The Kavik complex: The small collection of Kavik implements was dug from the grassy south bank of the Anaktuvuk River at the place about 4½ miles northeast of the summit of Anaktuvuk Pass where that stream bends northward toward the northern front of the range. The Kavik site occupies what appears to be a lower, stream-cut bench of the same kame terrace upon which the Tuktu site was discovered and lies only a few hundred yards northeast of the northern boundary of Tuktu. There is no indication, however, that the Kavik site area has been disturbed by stream action during recent times. Extensive testing of the site area, which may cover several acres, revealed thin, distinctive lenses of dark, organic stained soil which contained implements, many caribou bone and antler fragments, and ash and charcoal. Ash and charcoal occurred in sufficient quantity only to color the soil, and no samples were obtained for radiocarbon analysis. No recognizable fire hearths nor other features were found, although the abundant cultural debris strongly implies that Kavik was a habitation site.

Artifacts occurred from sod root level to a maximum depth of 11 inches below the present ground surface. The Kavik collection contains 63 chipped stone and antler implements, a quantity of antler and bone fragments, including a few large waterfowl bones, and 20 unretouched chert and chalcedony flakes, a small sample of the flakes encountered. All but one of the 18 flaked stone implements recovered are of chalcedony. That material from the Kavik site ranges from light gray to dull blue in color. There is one artifact of very translucent, dark obsidian, the only specimen of that material in the collection. The outstanding implement type in the small stone series is the stemmed, in some instances lozenge-shaped, Kavik projectile point (Pl. 6, 1-4). Five of seven points from the Kavik site conform generally to the type. The basal portion of one specimen appears to represent an unstemmed large point or end blade, and a tip fragment cannot be classified. The eighth Kavik point (Pl. 6, 1) was found in a kame about one mile west of the site. Other implements of stone include 12 rather large, bifacial knife-like tools (Pl. 6, 5), 4 end scrapers (Pl. 6, 7), and 2 elongate side scrapers (Pl. 6, 6). Thirty-seven antler artifacts include 1 arrowhead tip that looks quite modern, 2 other sharp tip fragments that may also represent arrowheads, 1 probable arrowhead blank, 1 peg-like object, 6 small rectangular pieces of problematical use, 1 nicely incised and smoothed fragment that contains on one surface raised projections between parallel, incised lines (Pl. 6, 8), and 25 fragments that show stone tool incising, cutting, or chopping scars (Pl. 6, 9).

While the age of Kavik is unclear, I think, on the basis of the excellent preservation of Kavik antler and bone materials, that it is no older than the Anaktuvuk Ipiutak component. In fact the presence of fragile bird bones in the Kavik site, including the extremely thin bony process of a goose maxilla, leads me to believe that the Kavik complex is younger than Anaktuvuk Ipiutak.

The cultural affinities of Kavik are also obscure. However, the meagre evidence relative to antler arrowhead types, the "flavor" of the other antler artifacts, and the characteristics of the generalized Kavik stone projectile point type imply that the complex belongs somewhere within the Eskimo continuum. I see a possible genetic relationship between Kavik stone points and those from various segments of the Kobuk River sequence, including Kobuk horizons that date as early as A.D. 1250 and 1400 (Giddings, 1952b) even though there are differences in size and style between Kavik and Kobuk forms. It is, I think, possible that Kavik stands somewhere in the direct line of Nunamiut Eskimo development although, as I shall presently note, the known Nunamiut archaeological record suggests recent, non-Brooks Range origins for that culture.

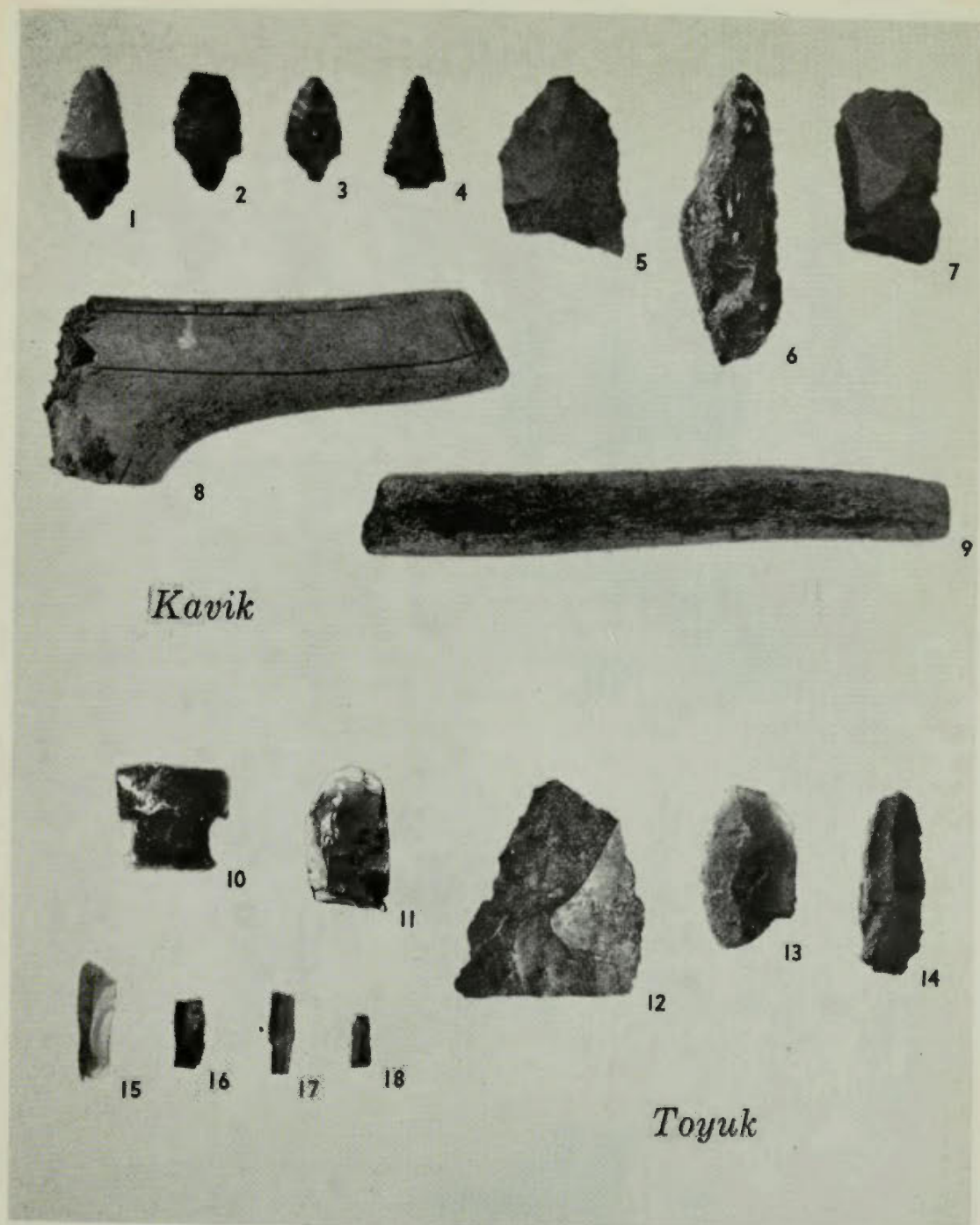
The Nunamiut culture: I have tentatively assigned 35 sites in the Anaktuvuk region to Nunamiut Eskimo culture. Nine of them were discovered by Irving in the upper Anaktuvuk River valley, just north of the summit of Anaktuvuk Pass (Irving, 1953). The rest occur in the upper Anaktuvuk valley, the upper John River valley as far south as a point about 20 air miles south-southwest of the summit of the pass, the Kalutagiak River valley (an upper John River tributary), and the vicinity of Chandler Lake, 30 air miles west of Anaktuvuk Pass.

Nunamiut archaeological sites fall into the following categories: dwelling sites, caches and cairns, shooting pits, burials, and caribou drives or pounds. Most, but not all, of the dwelling sites are situated on well-drained ground in

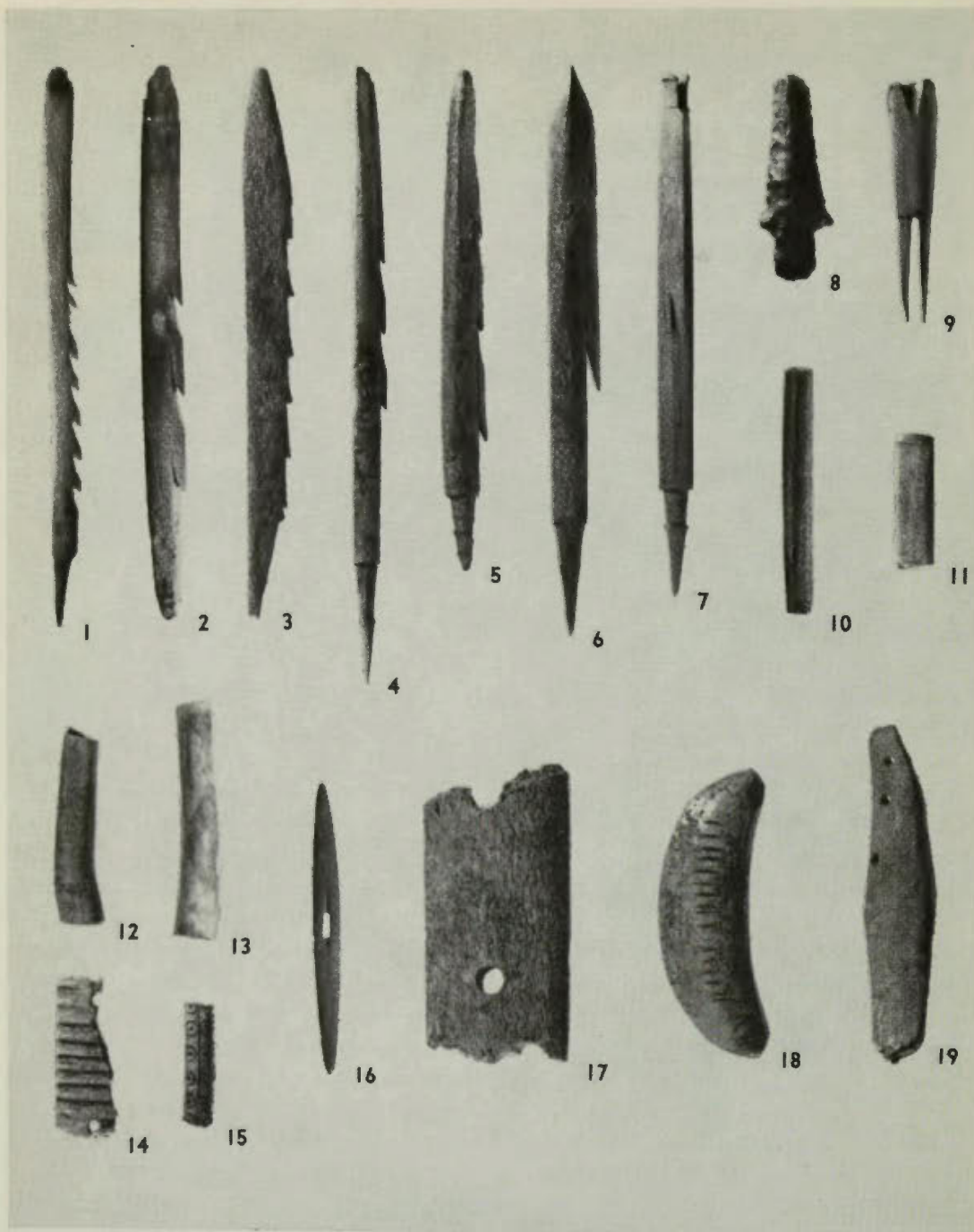
valley floor localities; a few occur well up near the mouths of tributary streams, and one outstanding example, an old, sheep hunters' encampment was found perched on the edge of a high ridge, hundreds of feet above the floor of the John River valley. House types include circular, hemispherical hide-covered summer and winter dwellings that today are marked only by rings of stone which protrude through, or lie just under, the sod; multi-sided, often octagonal, winter houses of willow frames covered with sphagnum moss, only the most recent of which have left recognizable remains; stone-sided dwellings, usually roughly oval in shape, which often contain walls of heavy stone slabs laid up horizontally to chest height; and variations on the latter type, for instance, one or more walls built outward from the side of a large boulder or other stone face. No clearly recognizable semi-subterranean Eskimo houses have yet been discovered in or about Anaktuvuk Pass, although it is not unlikely that they occur there. Nunamiut settlements are small, and usually no more than five or six house ruins occur together, although at Chandler Lake one large site contains more than twenty tent rings.

Caches and cairns are characterized by some striking forms. The single most outstanding Nunamiut architectural feature is a deep, subterranean meat cache or cellar, excavated in talus slides high on mountain slopes, or occasionally in stony outcrops at lower elevations. Although caches of that type often occur in clusters, they are usually difficult to find since the small openings are ordinarily nearly flush with the surrounding boulder surface. Some of them are very large, large enough, in fact, to serve as dwellings. I have measured a few that are as much as 12 feet in maximum horizontal interior dimension and, in some instances, they are 5 to 6 feet deep. The roof consists of large stone slabs overlapped so as to form an arch-like, very strong covering. The entrance, usually in about the center of the roof, is seldom more than 2 or 3 feet in diameter. It is possible that some of those underground chambers did serve as dwellings, although all that I have observed appear to have been used exclusively as meat caches rather than houses. Often the floors are thickly strewn with caribou bones. There are other, smaller Nunamiut underground caches, usually relatively shallow pits, dug into talus slides or other loose stone deposits, and occasionally into gravelly ground. Ordinarily those smaller forms are completely open at the top, as if they were originally covered with sticks, hides, or other perishable materials. There are also, scattered throughout the region, small surface caches or cairns constructed of boulders, or in some instances flat shale slabs. Examples of the latter type include rectangular box-like structures, 4 feet or a little more in length, 2 or 3 feet high, and neatly enclosed at sides, ends, and top with thin, flat, nearly board-like slabs of stone. Those of that variety which I have seen contained nothing other than a whittled willow stick or two, or an occasional caribou bone, and in one instance a large bird bone. Since the construction stones of all the caches and cairns just described are well covered with lichens, the structures are probably at least 50 or 100 years old, although there is no reason to think that any of them are of great age.

A few small pits, 2 or 3 feet in diameter and 3 or 4 feet deep, excavated in boulder outcrops were unquestionably used as shooting pits rather than caches. Several of those in a line at the foot of a talus slope on the west shore of Chandler



Pl. 6. Artifacts of the Kavik and Toyuk complexes. 1-4, points; 5, biface; 6, side scraper; 7, end scraper; 8, decorated antler object; 9, cut antler implement; 10, point or end blade; 11, flake end scraper; 12, 13, flakes; 14, flake having burin spall scar; 15-18, microblades. To scale, length of 1, 1 5/8 in.



Pl. 7. Artifacts of the Nunamiut culture. 1-7, 9, arrowheads; 8, point; 10, 11, sinew twisters; 12, needle case; 13, sucking or drinking tube; 14, 15, implement fragments; 16, snowshoe needle; 17, sled shoe fragment; 18, ulu handle; 19, man's knife handle. 1, 2, 10-19 to scale, length of 1, 6 1/2 in.; 3-9 to scale, length of 3, 5 7/16 in.

Lake contained old, empty 30.-30. rifle cartridges. Two or three more discovered along the north bank of the Kalutagiak River, between Anaktuvuk Pass and Chandler Lake, were very similar to those just mentioned but did not contain cartridge cases. Perhaps the construction of the latter preceded the introduction of firearms to the central Brooks Range.

I examined one burial at Chandler Lake, another just northeast of the summit of Anaktuvuk Pass, and have grave goods from a third, discovered by Eskimos about 17 miles north of the summit, near Tuluak (Tulugak) Lake. At Chandler Lake, an adult skull, a few bone splinters, and several artifacts were found at a depth of 3 feet in the foot of a talus slide. The burial was covered with large conglomerate boulders and marked by three split spruce sticks thrust between boulders beside the burial. The first Anaktuvuk Pass burial (noted above) was on the top of a kame terrace. A flexed adult skeleton, fairly well preserved, was found at a depth of 15 inches beneath large stone slabs, a great number of which had been piled to form a roughly circular mass, 14 feet in diameter. I did not see the Tuluak Lake burial, discovered by the Eskimos, but was told that it was situated just beneath the ground surface along a creek, and that only a few fragments of the skeleton remained. In all three instances, trade objects, as well as implements of Nunamiut manufacture, accompanied the burials.

The caribou drives or pounds are represented in the region about Anaktuvuk Pass by lines of stones at various localities along the sides of valleys. In some instances single lines of large boulders, often with smaller stones perched on top, and ranging from a few yards to 75 or a 100 yards apart, are strung out for a mile or more. Other examples consist of relatively short, nearly parallel lines of stones, the lines being 20 or more yards apart. No easily recognizable examples of pounds having extended wings have been discovered, but I think that some of the examples we have found may represent portions of what were formerly typical "key-hole shaped" drives. Others were apparently intended as drift fences which served to direct migrating herds toward waiting hunters, and even today the Nunamiut take advantage of the reluctance of the caribou to cross through those old stone lines, and occasionally add boulders or otherwise keep them in repair so as more readily to direct and to intercept those animals during the spring and fall migrations.

Hundreds of artifacts have been collected from the Nunamiut habitation and burial sites discovered in the Anaktuvuk area. Since at this writing the most recent Nunamiut archaeological acquisitions have not been counted and classified, I shall not here list all of the varieties of implements represented, nor shall I treat them numerically. Noteworthy types in the series, according to major activity represented include (1) hunting artifacts: firearms (both cap and ball and early breach-loading types) and firearm accoutrements, spruce wood self bows and compound bows, ivory and antler sinew twisters (Pl. 7, 10, 11), numerous antler arrowheads of several types (Pl. 7, 1-7, 9), stemmed and shouldered chert or chalcedony points (Pl. 7, 8), and men's knives having metal blades and antler handles (Pl. 7, 19); (2) fishing artifacts: spruce wood net floats, antler net sinkers, antler fish gorges, and ivory fish lures set with metal barbs; (3) artifacts of transportation: a spruce wood kayak paddle, spruce wood kayak frame fragments, antler and whalebone sled shoes (Pl. 7, 17), antler

sled runners, a spruce wood snowshoe frame, and bone snowshoe needles (Pl. 7, 16); (4) household artifacts: antler tent pegs, spruce wood buckets, a spruce wood bowl, iron trade buckets, a dolomite lamp, an iron shovel blade, sheep horn spoons and ladles, bone spoons, a spruce wood box, antler mall handles, large and small straight knives having metal blades and antler handles, stone whetstones, including a jade example, stone and steel ulu blades, an ivory ulu handle (Pl. 7, 18), antler and bone needle cases (Pl. 7, 12), caribou metapodial beamers, antler hide comb, and an antler snow beater; (5) artifacts of adornment, entertainment, or religion: glass trade beads, iron bracelets, a labret fragment of hardened tar, bone combs, spruce wood drum handles, and bird bone sucking or drinking tubes (Pl. 7, 13). Besides the types listed above, the Nunamiut collection contains a large number of fragmentary implements of bone, antler, stone, wood, and metal, the original uses of which are presently unknown to me. Further analysis will probably result in the eventual identification of many of the specimens in this category. Meanwhile, some of these as yet unidentified artifacts offer valuable insights concerning both the cultural relationships and technical and artistic skills of the Nunamiut (Pl. 7, 14, 15).

Two major conclusions concerning the origins and antiquity of the Nunamiut Eskimos emerge from what is presently known of Nunamiut archaeology. First, none of the many Nunamiut sites yet discovered in the region about Anaktuvuk Pass imply that the presently surviving Nunamiut and their antecedents have inhabited the area for more than a few generations. On the contrary, the archaeology abundantly testifies to the recency of central Brooks Range Nunamiut occupation. While the absence of associated artifacts or organic materials does not permit age estimates for some of the sites which I have assigned to Nunamiut culture, only two of the numerous Nunamiut dwelling sites that I have examined lack direct evidence of European-American contact. And in both those instances it is possible that metal implements were used in the manufacture of some of the wood and antler artifacts recovered. I have previously stated that the poorly known Kavik complex of Anaktuvuk Pass may represent a cultural antecedent of the Nunamiut. And the presence of Denbigh Flint complex sites and the Anaktuvuk Ipiutak sites in the area of the pass indicate the presence there, at several points in time during the past several thousand years, of cultures which in one way or another have contributed to historic Eskimo society. It is strange, however, in view of the abundance of early post-contact Nunamiut sites that we have not encountered, in our extensive surveys through the region, archaeological remains that would allow us to trace the Nunamiut directly back, well beyond the historic boundary.

Perhaps future work will reveal that unknown segment of Nunamiut prehistory, if indeed it exists. Meanwhile, however, the Nunamiut archaeological assemblage directly implies that the inland-montane society which it represents stands for Eskimo culture according to the common use of that term, that it is directly derived from the arctic coasts, and that it is recent in the central Brooks Range. Typological comparisons unmistakably relate the great bulk of the Nunamiut collection to the coastal sea mammal hunters to the north and west. And, while I do not know how long it has been since the Nunamiut turned away from the sea to become basically caribou hunters, unless one wishes to argue that such peoples as the Point Barrow Eskimos originated somewhere inland, one cannot derive the Nunamiut from the interior.

Conclusions

In this paper I have briefly summarized my interpretations of the cultural affinities of the several cultures represented at Anaktuvuk Pass, and I have also attempted to offer age estimates in each instance. While more extensive analyses of the existing collections and future finds may cause me to revise my present views of the central Brooks Range culture-time scale, some general conclusions can presently be drawn from the Anaktuvuk sequence, and from other recently established chronologies in arctic North America, that I think will stand the test of further investigation. First, far northern Alaska and particularly its arctic mountains cannot henceforth be viewed as any sort of cultural cul-de-sac or refuge area. For thousands of years the inland areas of high northwestern North America have supported enormous herds of large game which in turn have attracted and held successive hunting societies. That region has provided a strong economic base for one culture after another and as such has probably represented one of the most favorable human habitation areas in either of the Americas for most of the total length of time that man has occupied the western hemisphere.

Further, some of the components in the Anaktuvuk sequence testify to early cultural relationships between the Brooks Range and areas thousands of miles to the south in the Americas on the one hand, and areas far to the west in Eurasia on the other. The Kayuk complex, and other recently discovered, related components in the far north, directly connects early arctic hunting cultures with those in the Great Plains of the United States and Canada. In spite of our most imperfect knowledge of both the specific characteristics and ages of the various related components in that early hunting continuum, I am tempted to say that we may some day be able to speak of an area co-tradition of big game hunters that formerly ranged in western America from the Arctic Ocean to the plains of Mexico and perhaps beyond. Kogruk, and its affiliate the British Mountain phase of northern Yukon Territory, has, I think, quite specifically established a hitherto unknown, very early relationship between northern North America and Eurasia. Time will tell us more concerning the antiquity of man in the Americas and the cultural and geographical origins of the first American colonists. But meanwhile, Kogruk and British Mountain lead me to look more confidently toward the Old World Paleolithic in approaching the problem of man's first conquest of the New World.

Finally, these new northern finds point up a previously unknown, or, for that matter, until very recently even unsuspected cultural diversity in arctic and subarctic western North America. The Anaktuvuk sequence, for instance, appears to be largely a non-developmental one. By this I do not mean to imply that no relationships exist among the cultures represented there. The connection between the Denbigh Flint complex and the Ipiutak culture is a generally recognized one, and Nunamiut culture certainly belongs in the same broad continuum as Denbigh and Ipiutak, as does possibly the poorly defined Kavik. But nowhere in the known Anaktuvuk chronology is one component clearly and directly derived from another. Future work in the central Brooks Range may turn up a series of transitional sites that neatly tie the various Anaktuvuk components within a frame of genetic continuity, but I doubt it. Rather I think that the known archaeology of the central Brooks Range testifies to the

former presence there, at separate points in time, of distinctive societies representing different cultural traditions.

This point of view contains the implication that through time the primary mechanism characterizing Brooks Range culture change has been successive, intrusive cultural replacement rather than the sort of *in situ* development that results in the emergence, one after the other, of discreet cultural units within a single tradition. That process of replacement was undoubtedly repeated at least several times in several thousand years, and perhaps the pass has been unoccupied for extended periods since man first settled there. I do not wish to conjure up emigrations with which to explain the different complexes at Anaktuvuk Pass, although seasonal migrations may explain some of the cultural variety there, and we may assume that such a broad natural highway as Anaktuvuk has seen its share of travelers. Rather I think the archaeological remains primarily represent separate hunting societies, often having quite separate cultural origins, who gradually expanded their territorial boundaries into the region, who knew how to kill big game effectively and in large numbers, and who, in each instance, were content to settle in the higher reaches of the range and to exploit its resources, quite probably for generations.

A PROVISIONAL COMPARISON OF SOME ALASKAN AND ASIAN STONE INDUSTRIES

William N. Irving

A thorough treatment of the question of interhemispheric connections, as evidenced by stone tools, is suggested by the title of the paper, but this is misleading. Rather, the paper presents a trial taxonomy, based on MacNeish (1959b), of the best-known Alaskan and northwest Canadian collections thought to date from between 10,000 and 1000 B.C., and a review of their possible relationships to Asian materials with special attention to collections recently reported from Japan. The paper is as much concerned with promising approaches to the problem as it is with solutions and results; at the same time, it presents some conclusions about chronology and relationships which may prove durable.¹

In considering the Alaskan materials, I have dealt, for the most part, with highly specialized types and modes (Rouse, 1953; 1960), industries, complexes of types, and traditions. At the present stage of work in this area it is seldom profitable to give much attention to whole cultures.

A tradition, as the term will be used here, is an aggregate of type complexes which, by virtue of their sharing distinctive artifact types and other distinctive features such as styles of decoration and geographic distributions, give the appearance of having been derived from a common predecessor. Persistence and historical continuity over long periods of time are implied. A tradition is only part of a culture, and it is not necessarily co-terminal in time or in space with a culture. Cultures may exist in which more than one tradition is represented; there may be others which cannot be classified or analyzed in terms of traditions in the present state of knowledge. In this event, it may be possible nevertheless to speak of complexes, that is, of aggregates of types found to recur in a reasonably consistent pattern in several sites of about the same age. 'Complex' has much in common with 'tradition', but it lacks great time depth and is a smaller taxonomic unit. Industry is understood to mean a specialized manufacturing technique together with implement types and other diagnostic traits associated with it. It may have considerable time depth. Grouping parts of two collections in one industry implies historical connection of some sort between them. Specialized types and modes are implements or features of

¹The assistance of Chester Chard and Harumi Befu, whose knowledge of the Russian and Japanese literature on pre-ceramic materials was indispensable to the preparation of this paper, is gratefully acknowledged; however, they are not to be held responsible in any way for the views expressed.

style or technique of distinctive, easily recognizable form which are not likely to be confused by a classifier with other types. The number of these that have proved useful so far is small. Obviously, only a portion of the significant archaeological materials now available can be handled with a scheme of this sort, which is intended to be used in comparative and chronological studies on a broad scale. In some cases the notion of tradition, although it may be useful in distinguishing one cultural phenomenon from another, is difficult to justify on any other basis. Thus, the Northwest Microblade tradition is clearly different from a number of others, and therefore a useful notion, even though at present it has little internal consistency.¹

For the present, I recognize four major Alaskan traditions in the time range under discussion. There are, of course, others. MacNeish (1959b), on whose work I depend heavily, has proposed a list of ten in a scheme which covers all of northern North America. However, I can deal effectively with only four traditions, and two of these are of doubtful status.

Of these four, the Arctic Small-Tool tradition (Irving, 1957; MacNeish, 1959b) is the best known. It is represented by the Denbigh Flint complex (Giddings, 1951) and by a number of sites distributed from near Bering Strait to Greenland.² The sites are all near the tree-line or on the coast; with one exception (Irving, 1957), which is of very dubious significance, none has been found in the forested interior. The tradition has many distinctive types and other features; those that are most useful for comparison are:

Large numbers of microblades struck from conical cores;
Burins with extensive retouch on one or both faces and prepared for hafting ('tanged burins'), of several types;
Burin spalls retouched for use as minute engraving tools;
Many, very small, bifacially retouched, inset side blades, less than 4 cm. long, with distinctive crescentic (not rectangular) shapes;
Many, very small, biface points without stems or notches, but of specialized form;
Medium size (4-10 cm. long) biface points and knife blades, without stems or notches;
Scarcity or absence of implements made by grinding or polishing, and of large implements;
At most sites, absence of pottery;
A unique style and technique of fine workmanship, which at most sites appear on most of the implements.

Most of these characteristics are very distinctive, and would lead one to suspect the presence, or at least the influence of the Arctic Small-Tool tradition wherever they are found. However, no single trait is known with certainty to be peculiar to this tradition.

According to the stratigraphy and C-14 dates from Iyatayet at Cape Denbigh, the Arctic Small-Tool tradition must have appeared in Alaska well before 2000 B.C. (Hopkins and Giddings, 1953; Rainey and Ralph, 1959; Giddings, 1960a). Giddings believes, on the basis of Hopkins's geological interpretation and his own beach ridge chronology at Cape Krusenstern, that the Denbigh Flint complex was present in northwestern Alaska at least as early as

¹In the case of certain traditions, the percentage composition of collections given in terms of major typological groups of artifacts is cogent evidence for distinguishing one tradition from another. It is not possible to reproduce here the multi-colored graphs shown at the Symposium meetings, or to reduce them to black and white.

²e.g. Giddings, 1956; Harp, 1958; Irving, 1953; 1954; Knuth, 1954; Larsen and Meldgaard, 1958.

2500 B.C. (1960a, p. 125). The influence of the tradition is recognizable in the later Norton cultures and others in western Alaska as late as Ipiutak, but probably by 500 B.C., if not before, it had lost its distinctive character and merged with or developed into other traditions. A rough, but probably not grossly inaccurate, estimate for the duration of the Arctic Small-Tool tradition is from 4000 to 1000 B.C.

Tolstoy (1958a,b) points out that most, if not all, of the specialized types shared by the Lena basin and northern Alaska date from later than Serovo times (after 2500 B.C. according to Okladnikov's chronology, after 2000 B.C. according to that of Chard, 1958a, and others) where they occur in Siberia. There is also little or no evidence for historical connections with the Arctic Small-Tool tradition to be found in the collections from the Baikal 'Neolithic' (Okladnikov, 1950). Recently reported materials from the Chukchi Peninsula (Krader, 1952; Chard, 1955b; Okladnikov and Nekrasov, 1959) share some of the attributes of the Arctic Small-Tool tradition, but are not to be included in it according to present criteria, and probably are too recent to be considered among its antecedents. We are led to concur in principle with Giddings (1960a, p. 129), who says "it is beginning to look to me as if none of the coastal assemblages of the Bering Strait region, as far back in time at least as the Denbigh Flint complex, has originated elsewhere". However, a plausible alternative suggested by Chard (1959, p. 45) must be borne in mind: the early sites we require may be under water along the North Pacific and Bering Sea coast of Asia.

MacNeish (1959b, 1960) has proposed a Northwest Microblade tradition, represented by the Campus Site, near Fairbanks, the Pointed Mountain site near Fort Liard, and a number of other sites scattered over much of the Northwest and Yukon territories. Although some of these sites are near the present tree-line, none has been found yet in the tundra or the Barren Grounds proper, and with but two possible exceptions (Cape Krusenstern—Giddings, 1960a; Engigstciak—MacNeish, 1956a), none has been found on or near the coast. The distribution of sites is thus complementary to that of the Arctic Small-Tool tradition. MacNeish (1959b; 1960) has suggested that certain microblade sites in southern British Columbia (Borden, 1952) be included in the Northwest Microblade tradition. For the present, I prefer to leave the southern and eastern boundaries of it undefined, at least until more is known about somewhat similar materials from the northwestern United States.

The sites often occur on low bluffs overlooking river valleys, or on the shores of lakes. Their inventories are somewhat variable, but they always include microblades, struck, in many cases, from both conical cores and a highly specialized type of core called variously tongue-shaped, wedge-shaped, or boat-shaped. The core is an interesting type, which will be discussed at greater length later on. Of the types and features listed as diagnostic of the Arctic Small-Tool tradition, not one, except the absence of pottery, is characteristic of the Northwest Microblade tradition site. Where burins, microblades, and biface tools occur in the forest sites, these are quite different in type, style, and technique of manufacture from their counterparts in the northern tradition. The burins are never retouched for hafting; like the conical cores, they tend to be irregular in shape. The biface tools show none of the fine

workmanship characteristic of the Arctic Small-Tool tradition, and often the points and knives have stems or notches.

In addition to these categories of tools, the interior sites also have:

Large and small end scrapers, usually with little dorsal and no ventral retouch;

Occasionally, large, chipped ovoid blades;

Occasionally, *tcí-tho* (boulder chip) scrapers;

Large, plano-convex side scrapers;

Often, many modified flakes, and sometimes—but not at the Campus site—modified microblades. Probably many types can be identified, but these are difficult to classify consistently.

Many Northwest Microblade tradition sites contain a number of other types, indeed, one of the characteristics of the tradition is that its composition is highly variable. This and other evidence reviewed below suggests that it lasted for a very long time, probably longer than did the Arctic Small-Tool tradition. The principal diagnostic of the tradition—the occurrence together of microblades and stemmed or notched points—needs to be added to if we are to distinguish it from other presumed traditions to the south and east. In the present state of descriptive taxonomy, the other attributes listed here are not sufficient for the latter purpose.

MacNeish (1954, 1960) would put the beginning of this tradition as far back as 5000 B.C. and perhaps farther, if I understand correctly his use of soil profiles and correlations with the climatic optimum. At Cape Krusenstern, as reported by Giddings (1962¹), side-notched points of the Palisades assemblage, which may represent the Northwest Microblade tradition, appear to be earlier than the Arctic Small-Tool tradition, and thus more than 5,500 years old. MacNeish's N. T. Docks component at the Franklin Tanks site on the Great Bear River has a C-14 date of 3500 B.P. (1953), and others, obtained by the acetylene method, of 4100 and 5000 B.P. (1960, p. 48). MacNeish (1960, p. 48) thinks this component is relatively late in the tradition. The few other sites which have been given estimated dates tend to confirm the impression that the Northwest Microblade tradition began before the earliest recorded appearance of the Arctic Small-Tool tradition, and lasted so that it was contemporaneous with most of the latter tradition. There is very little evidence in Alaska or western Canada of any sort of acculturation between the two traditions. Where there is indication of traits having passed from one to the other, the sites appear to be very late (e.g., Firth River phase, Engigstciak, MacNeish, 1959a; possibly Choris, Giddings, 1957; and the later notched points at Cape Krusenstern, Giddings, 1960a). Taylor (1959b) has suggested that eastern representatives of the tradition may have contributed microblades, side-notched points, and end scrapers to the Dorset culture, which almost certainly received most of its other traits from the Arctic Small-Tool tradition.

In a forthcoming paper I shall discuss the New World connections of the Northwest Microblade tradition in more detail. For the present, it need only be noted that, in spite of the many intercontinental parallels pointed out by MacNeish (1959a), the only type in the Northwest Microblade tradition which now seems likely to have come directly from Asia is the tongue-shaped core, the significance of which was first noted by N. C. Nelson (1937). Burins made on blades or flakes may have accompanied these cores, but they and

¹All 1962 dates refer to papers in this volume.

conical cores may also have come to this tradition from still earlier New World blade and burin industries. Of the other traits listed above as being characteristic of the Northwest Microblade tradition, those that occur in Asia at all have also a very wide distribution in the New World on fairly early time levels. Possibly a comparative analysis of the types of modified flakes and microblades would reveal similarities suggestive of diffusion from Asia as MacNeish has stated; however, the present condition of taxonomy on both sides of the Pacific makes such comparisons impossible to verify without an immense amount of labor.

Tongue-shaped cores from North America have been illustrated or described by N. C. Nelson (1937), Rainey (1939; 1940), Irving (1953; 1955), MacNeish (1954 and elsewhere), Solecki (1951), and Knuth (1954). In only a few of these publications are they noted as being a distinctive type. The essential features of the type are: a 90-degree angle between the striking platform and the fluted surface (surface from which microblades are struck); fluted surface relatively narrow and with a small transverse radius; end opposite the striking platform modified by percussion to a knife-like edge, presumably to fit into a groove in a wooden anvil. Some of these features occur in combination with others; for instance, a core from a late Arctic Small-Tool tradition site in the Brooks Range has a sharpened terminal edge and a faceted striking platform at about a 50-degree angle to the fluted surface (Irving, MS.). However, the type as it has been defined occurs widely in Asia, as will be shown subsequently, so it is useful to adhere strictly to its present definition.

Many traces of Paleo-Indian occupations have turned up in northwestern Canada and Alaska, but most of these have been found as single specimens or in such small numbers that it is difficult to define complexes. Practically the entire range of well-known Paleo-Indian points has been identified by one investigator or another; the majority of them, however, are rather large, lanceolate specimens, unfluted but of fairly careful workmanship. MacNeish may thus be justified in speaking of a 'Yuma' tradition (1959b); however, the relationships of "Plainview, Agate Basin, Milnesand, Angostura, and Scotsbluff" points (MacNeish, 1959b, p. 6) in the Plains are so complex and diffuse that the concept of tradition as it is being used in this paper is difficult to apply there. Quite possibly, more than one tradition with large, lanceolate points will have to be recognized. For the present, however, it is convenient to speak in terms of a Yuma tradition when discussing the far northwest, bearing in mind the reservations about this concept expressed at the beginning of the paper.

MacNeish has listed most of the sites that belong in this category. Like those of the Northwest Microblade tradition, these rarely occur very far north of the tree-line or on the coast. The chronology of these sites has been discussed by MacNeish (1959a,b) and Harp (1962); MacNeish thinks it likely that C-14 dates for his Great Bear River complex, which are between 2500 and 3000 B.C., are end dates for the tradition. Dates just cited for the stratigraphically later N. T. Docks component indicate that these are much too recent. Harp, however, thinks that his representatives of the tradition (although he does not use this terminology) can be dated no earlier than 3000 B.C. along the forest border in the District of Keewatin. Both are in agreement that these complexes are somehow related, and are derived from predecessors in the Plains

rather than from Asian cultures, a position which agrees with that of Wormington (1957), Chard (1959), and the present writer.

Tangential to the problem of interhemispheric relationships is the position of this tradition with respect to cultures of the Bering Sea region, and particularly the Arctic Small-Tool tradition. The Kayuk site, in the central part of the Brooks Range of Alaska (Campbell, 1959) is one of the largest Paleo-Indian occupation sites known, and of great interest in this connection. It is characterized primarily by large points something like Angostura points, together with a relatively small number of end scrapers and side scrapers made on large blade-like flakes, and some medium-size discoidal bifaces. It is my belief that the bone and antler implements from the Kayuk site, some of which are very much like Ipiutak types, are intrusive; however, no other distinctive Ipiutak types are present. The same holds for the two burins and the single microblade, the only Arctic Small-Tool tradition types in the collection. Material of the latter sort is even more common than recent Eskimo stone implements in the central Brooks Range, so if anything, one should wonder that there are not more intrusive representatives of the Arctic Small-Tool tradition in the Kayuk site collection. On the basis of these typological observations I agree with Campbell's present view (1962), that the Kayuk complex is not an intermediate phase between the Denbigh Flint complex and Ipiutak, and that it is probably earlier than the former. The small number of types in the Kayuk complex, when contrasted with the great variety of implements present in the Denbigh Flint complex and the different proportional representation of types in Ipiutak further supports the contention that the Kayuk complex was not perceptibly affected by the Arctic Small-Tool tradition, although the latter was at one time firmly established in the Brooks Range (Irving, 1953; 1954). It remains to be seen, then, what dates are to be assigned to the Kayuk complex, and what, if any, contributions it or other members of the Yuma tradition made to the Arctic Small-Tool tradition.

The occurrence of a few large points possibly related to the Yuma tradition (but often more like Eden than like Kayuk points) in certain Arctic Small-Tool tradition sites but not in others, and the occasional occurrence of a fluted point in these sites, suggests that the historical picture is far more complex than can be demonstrated at present. None of these types, however, is indicative of close connections with known Asian cultures. The vast distribution of the several kinds of collateral flaking in Asia and North America disqualifies this trait from the list of criteria for the sort of comparisons being made here, and the chances of parallel, independent development of lanceolate points of the same general form in widely separated parts of the world appear to be good enough to make comparative studies of these implements an extremely hazardous undertaking.

In summary, the Paleo-Indian materials in far northwestern North America may perhaps be grouped in a single 'diffusion sphere' (Caldwell, 1958), but it appears injudicious to lump them all in one tradition. The term 'Yuma tradition' is used here to include the Kayuk site and closely related materials, for convenience in contrasting these with other traditions. If this identification is allowed to stand, it is unlikely that complexes represented by MacNeish's Champagne and Little Arm complexes (1960) in the Yukon Territory should be included in the Yuma tradition. There is little or no indication of contact

with Asian traits except in the case of a few of MacNeish's sites in which a microblade industry with tongue-shaped cores is present. Dates for Paleo-Indian occupations remain uncertain. MacNeish (1960) presents fairly convincing evidence that these may have begun as early as 6000 B.C. in the Yukon Territory; they may have lasted much later, and perhaps merged with early representatives of the Northwest Microblade tradition.

A fourth major taxonomic unit is suggested by the Aleutian core and blade industry described by Laughlin and Marsh (1954; 1956). This is represented at the workshop site on Anangula Island and at the bottom of the nearby Chaluka midden on Umnak; the workshop site, however, is the only one which has been fully analysed and published. An outstanding feature of this site is the overwhelming representation of large blades. Although there is a great variation in the size of the blades, their average thickness is more than 6 mm. When it is considered that the average thickness of microblades in collections of the Arctic Small-Tool tradition and the Northwest Microblade tradition is in the neighborhood of 2 mm. (Irving, 1953), it is obvious that the Aleutian blades have very little in common with the others. The cores appear to be conical, and most are of small or medium size. A number of the large blades have been modified to serve as end or side scrapers, or as a sort of engraving tool with a retouched, pointed end. Only one or two implements not made on blades were found, and there are no burins in the collection.

Concentrated in the lower half of the deep Chaluka midden there was found a number of similar blades, together with biface stemmed points, knives, and other implements which Laughlin and Marsh (1956) identify with an early Aleut or proto-Aleut-Eskimo culture. None of the latter types bear close resemblance to types that have been discussed so far.

The question arises, is the Anangula blade industry to be considered a complete stone tool kit, or just a part of one. If the latter should be the case, it may belong with the Chaluka material and date from 1000 B.C. or earlier. In view of the rather striking resemblance of Anangula scrapers and graters to certain Ipiutak types, this association and the implied date appear plausible; however, a blade industry has not been reported in the Ipiutak collections (Larsen and Rainey, 1948).

Large blades (Solecki, 1951) and blade-like flakes (MacNeish, 1956a; 1962; Campbell, 1962) have been reported from interior northern Alaska and the Yukon Territory, where the latter authors consider them to be relatively ancient. In general, where they are associated with other types, these do not resemble closely any types from the Aleutians. The same observations apply to the larger blades in MacNeish's Little Arm, Gladstone, and Taye Lake complexes (1960).

The status of the Aleutian core and blade industry as part of a tradition is at present unclear. It seems to be unrelated to other core and blade industries, and the Chaluka complex, in which it may belong, does not fit neatly into any of the traditions discussed here. Although blades and blade-like flakes have a very wide distribution in North America, it is unusual for them to occur as a highly specialized industry. The Aleutian industry appears to be unrelated to any of the microblade industries, so it probably is derived from complexes in the Bering Sea region which have not yet been defined.

To sum up, the New World material reviewed here may be considered in terms of four major categories of sites, which seem to have had different

histories and relationships. The Arctic Small-Tool tradition seems to be a valid taxonomic unit in terms of the definition of tradition used here. The Northwest Microblade tradition has much less cohesion, but still may be viewed as a taxonomic unit. The 'Yuma tradition' is less well represented, but certainly comprises materials that are distinct from those of the first two. The Aleutian core and blade industry leads one to suspect the existence of still another tradition in the southern Bering Sea-northern Pacific Ocean region, evidence for which is at present very sparse. It was pointed out that other Paleo-Indian materials besides those placed here in the Yuma tradition must be reckoned with, and further, that apparently ancient industries based on large blades and blade-like flakes in northern Alaska and northwestern Canada do not fit in the present four-fold scheme.

It has not been possible to treat the Asian materials in the same manner as those from northwestern North America. The re-synthesis of these collections, although it would be desirable from some points of view, would be extremely difficult because of the sporadic coverage in the literature and the difficulty of getting actual numbers of artifacts from most of the Russian sources. For the most part it is necessary to depend on highly specialized types and modes for comparison, except in the cases of certain Japanese sites and those reported by Maringer from Mongolia (1950).

In general, information from north of the Amur and east of the Lena rivers is still sparse. However, the discovery and interpretation of the Lake El'gytkhyn materials (Okladnikov and Nekrasov, 1959), considered to be more than 4,000 years old, leads one to hope that Russian archaeologists have at last turned their attention to the mountainous interior of the Chukchi Peninsula (cf. also Chard, 1960c). Similar terrain in northern Alaska has been very productive, and it is becoming apparent that most of the north Alaskan maritime cultures had inland counterparts. Indeed, this seems to have been the case in most parts of the Arctic, and it may be expected that, even though early coastal sites may never be found on the Chukchi Peninsula, a good archaeological sequence can be constructed in the interior which will permit inferences to be made about developments on the coast and the passage of traits between this area and Alaska.

The rest of the mainland of eastern Asia has produced remarkably little that suggests close connections with pre-ceramic stone industries of northwestern North America. The Baikal cultures have long been considered as possible sources of Eskimo traits (Collins, 1951a), Archaic traits (Griffin, 1960), and early American arctic traits (MacNeish, 1959a). It is true that microblades, small biface points, large biface points, points with stems, inset side blades, and excellent collateral flaking occur in the Isakovo or Serovo stages, and also in some of the early Alaskan complexes. However, most of these traits occur in many other parts of Asia and North America, and it seems unlikely either that they all originated around Lake Baikal or that they were amalgamated into a complex there which was then exported to Alaska. Tolstoy was cited previously as having shown that traits shared by Bering Strait cultures and the Lena basin are relatively late in the latter area. Until Russian archaeologists find sites earlier than 5000 B.C. in the Lena valley or the adjacent uplands, it will be very hazardous to cite the Baikal region as a place of origin for American traits considered in this paper.

The same stricture applies to hypothetical derivations from other, less well-known, parts of Asia. The current disagreement over the typological position of the site of Mal'ta (Okladnikov, 1959a; Gerasimov, 1960) makes it impossible

for someone—such as the present writer—without a thorough knowledge of Russian and of the history of work at the site to assess its relationships to Alaskan sites thousands of miles and many ecological zones removed from it. At the same time, it is difficult to equate any of the great taxonomic entities of the New World (e.g., the Plano complex, the Llano complex, Paleo-Indian, or the traditions mentioned in this paper) with any comparable entity found in Asia, or even to suggest a generic relationship between such great entities.

Two other approaches to the problem are suggested. One is to consider the distribution of highly distinctive traits which occur both in Asia and in North America in sufficient numbers from reasonably well-dated sites so that the direction of movement can be inferred. This presupposes that traits may cross cultural boundaries. This not very original observation suggests that our cultural taxonomy may not be equal to the task of documenting the major sweeps of cultural phenomena between hemispheres, as it now stands. Another approach is to look to those parts of Asia which are both well represented in the archaeological literature and likely, for geographical or other reasons, to have a record of the transfer of traits from one continent to another. The latter course leads to a consideration of newly available materials from Japan, which is marginal to the Pacific-Bering Sea maritime region which Chard, on the basis of his redefinition of east Asian prehistoric culture areas, suggests is the most likely place in which to look for close correspondences to American cultures (1958a,c; 1960a,c).

A single case is all that can be mustered at present to illustrate the first approach. The tongue-shaped core, mentioned previously, is a prominent type in parts of continental east Asia and also Japan; it is also well established in parts of North America. A search of the available Asian literature shows that it does not occur far north of Irkutsk, where it is found at the site of Verkholsenskaya Gora (Field and Prostov, 1937, Fig. 1, 6, 7), presumably in Paleolithic Stage III although some of the Verkholsenskaya Gora material is now thought to be earlier (Wormington, 1959). A possible representative of the type from the lower horizon at Afontova Gora is reproduced by Efimenko (1953, Fig. 291, 1). It is found also in the Neolithic and possibly Mesolithic collections from Mongolia (Ikhen-gung: Maringer, 1950; Shabarakh Usu: Berkey and Nelson, 1926), and in Manchuria near Harbin (Ku-hsiang-t'un: Cheng, 1959). So far as I can determine, it does not occur in the Baikal Neolithic or in the Middle Lena collections; it is not known to occur in China proper.¹

Okladnikov (1958a, pp. 549–50) recognized the type at a site on the Tigrovaya River near Vladivostok. He compared the Tigrovaya specimens with “similar objects . . . on the middle reaches of the Amur River” and also with “a polyhedric . . . tool of the so called core scraper type” like those typical of Verkholsenskaya Gora, the Gobi, and the Campus site in Alaska, and suggested that Tigrovaya be considered an intermediate link between the continental Asian and American distributions. In the light of confirmatory evidence from northern Japan, where the type is prominent and evidently quite early, it seems likely that it did indeed pass into the New World by way of the Okhotsk-North Pacific region.

The Asian distribution of this type, exclusive of sites in Japan and the Soviet Far East, is mainly in the steppe or near the steppe-forest border. The

¹However, Sosuke Sugihara has told me that the type may be present in a new site in southern Shansi.

fact that it did not penetrate the Baikal-Lena region or the American arctic or subarctic maritime, and in the New World remained in the far northwestern boreal forest (with a few, relatively late exceptions) suggests that important, as yet unrecognized, cultural—rather than environmental—factors governed its transmission.

Sketchy and tentative though it be, the sequence from Hokkaido is at present the best available from the Asian part of the area included in Chard's North Pacific continuum (1960a). If, as appears likely to this writer, the continuum proves to have been a route of diffusion with considerable time depth, the sequence now emerging from work in Hokkaido will be very important. Pre-ceramic archaeology in Japan has made great strides forward since the recognition of Paleolithic artifacts in the Kanto Loam at Iwajuku in 1949 (Sugihara, 1956). Befu and Chard have presented a complete review of the field (1960), so I shall refer here only to the most relevant materials from Hokkaido. Of the dozens of pre-Jomon components reported on there, those from the Shirataki and Tachikawa sites are the best documented and they have been integrated into a scheme of relative chronology by Serizawa and Yoshizaki (1959) in an important review paper.

Presumably all of the pre-ceramic material dates from before 3000 B.C. (MacCord, 1959). I have not considered the implications of recent C-14 dates from Natsushima near Tokyo, which put the beginning of pottery there at about 7000 B.C. (The stratigraphy and suite of dates are said to be very convincing). The Hokkaido sequence is based largely on comparative typology, and there is very little in the way of stratigraphy or terrace chronology to support it. Unless otherwise noted, the following information comes from Serizawa and Yoshizaki (1959) which supersedes a more detailed review written earlier by Serizawa and Ikawa (1960).

The earlier part of the sequence is represented by several excavation localities on terraces of the Yubetsu River near Shirataki village several miles from the coast of northeastern Hokkaido. Localities 4 and 27, on the 40-meter terrace, are presumed to be the oldest. They produced small collections characterized by retouched blades or blade-like flakes, used flakes, and a single small implement which may be a rough form of "boat-shaped tool".¹ There seems to be no reason for regarding this assemblage as being especially early, other than its provenience from a relatively high terrace and the simplicity of the type inventory. Yoshizaki, in a recent letter to Harumi Befu, expressed uncertainty about the chronological position of these localities.

Locality 13, on the 20- to 30-meter terrace, produced a somewhat larger number of types from a clay layer which is overlain by gravels—presumably alluvium. From this intriguing stratigraphic situation came large blades, retouched blades in the form of scrapers and piercing or cutting implements—some with extensive flat retouch, burins made with a single blow, boat-shaped tools thought to have been used as scrapers, and a discoidal biface implement tentatively labeled "handaxe". Serizawa and Yoshizaki, with reference to the views of Masao Minato, a geomorphologist, suggest that these remains may be correlated in time with the mammoth bones found without any associated artifacts at Erimo Point in southeastern Hokkaido. They attribute both finds to

¹This term includes implements of several kinds and uses. Some resemble Aurignacian keeled scrapers; others are clearly not scrapers (Serizawa, 1957, p. 36). The group apparently includes also some tongue-shaped cores.

the Tottabetsu glaciation, which has several stages, and is thought to be the Hokkaido equivalent to the Last Glaciation. The mammoth is considered evidence for a land bridge connection between Hokkaido and the mainland via Sakhalin. This writer infers, from the general character of the inventory and the guess date ascribed to it that the material might be compared with Afontova Gora and Verkholsenskaya Gora (Efimenko, 1953).

The next stage at Shirataki is found at Locality 33 and several others, and at other sites as well. The collections apparently are larger than those of any preceding stage. The terrace at Locality 33 suggests that it may be considerably later than Locality 13. The number of types and varieties of implements are relatively large, and include several kinds of scrapers and burins, many boat-shaped tools, rather crude blades, implements described as looking a little like handaxes and, perhaps most significant, biface points. Some of the burins are said to have been made on points, a feature which calls to mind certain characteristics of the Araya-type burins of later stages. Presumably, the boat-shaped tools are accompanied by small, parallel-sided spalls which Japanese archaeologists do not recognize as microblades because they show no signs of retouch or wear through use. Yoshizaki and Serizawa (1959) think that Locality 33 corresponds chronologically with the "Point Culture" of Kanto and Chubu districts; they consider both to be late Pleistocene in age.¹

The stage represented at Shirataki by Locality 30 and elsewhere, apparently differs little from the preceding one except for the presence of "Shirataki engravers" made by the "Yubetsu technique". Shirataki engravers resemble boat-shaped tools and tongue-shaped cores so closely that one must suspect that a single, rather specialized form has been put at different times to a variety of uses. The engravers are diagnosed from longitudinal scratches on what would be the striking platform had they been classed as cores. The "Yubetsu technique" is the removal from what the writer would term the striking platform of narrow, rather thick "ski-shaped spalls". The implement defined thus resembles nothing so much as a core burin; Yoshizaki *et al.* (1959) and the present writer independently have noted an analogy between ski-shaped spalls and the burin spall artifacts of Giddings (1956). However, it remains unclear as to whether or not the ski-shaped spalls were retouched and used as implements. Yoshizaki, in a letter to Befu, notes that at certain sites in Hokkaido and northern Honshu some "Shirataki engravers" were used as microblade cores. As in the case of American tongue-shaped cores, some of these appear to have been made on parts of biface points. In this writer's opinion, Americanists may lump under the rubric "tongue-shaped core" both the microblade cores from the Campus site and cores from Japan which resemble Shirataki engravers. Ski-shaped spalls have not been recognized outside of Japan, but the form of the striking platform on tongue-shaped cores suggests that this is because of an oversight on the part of observers. Serizawa and Yoshizaki (1959) cite a distribution for implements resembling Shirataki engravers very much like that given for tongue-shaped cores in the preceding section on the mainland of Asia. They mention also Djalai-Nor in the Amur River province, Chi-chüe-ching-tsu in Sinkiang, and Zabochka on the Yenisey River. Many

¹In a letter to Befu dated 21 October 1960, Yoshizaki foresees a necessity to reverse the chronological relationship between Localities 33 and 30, so that the latter is the earlier of the two. This is because he has recognized both Araya burins and the Yubetsu technique at Locality 33, whereas Araya burins do not occur at Locality 30 and related sites.

of these sites are probably of Neolithic age; for the present, the best evidence for the type having originated at an earlier time comes from Hokkaido and Verkholenskaya Gora. In both of these regions it is earlier than the Northwest Microblade tradition, so a movement of the trait from Asia to America is indicated.

The relative chronology becomes still more complex and uncertain with the elaboration of microblade industries following Shirataki Locality 30. We have to contend here with a variety of small collections, many of which have been published in preliminary reports only. Further, there is the problem of collections like that from Tachikawa Locality 1, in which a number of blade implements like those from Shirataki Locality 13 was found along with microblades, tongue-shaped cores, and burins that approach the Araya type.¹

The Sakkotsu assemblage, on the other hand, consists of 160 microblades, a scraper made from a large biface, and a flake with a retouched pointed end; a single Araya burin found on the surface of the site may not belong with the excavated assemblage (Serizawa, 1957). At the Kaributo site in southwestern Hokkaido, one of the localities (Rankoshi) produced microblades, a tongue-shaped core, various scrapers, blade-like flakes, and three small triangular stemmed points. The Hirasato locality at the same site produced a similar assemblage, although the types and proportional representation differ in detail. That the microblade industries with various associated types are later than complexes dominated by large blades is a reasonable supposition in the light of what is known from eastern continental Asia and elsewhere. It is difficult to find specific parallels for any of the Hokkaido complexes on the mainland; presumably the appropriate sites have yet to be found. It is possible that the Araya burin is closely related to the generic group of burins which distinguishes the Arctic Small-Tool tradition; it seems to resemble these more than any others found so far in northern or eastern Asia.

According to Yoshizaki *et al.* (1959), the microblade industry was displaced by the introduction of bifaced points, which obviated the presumed need to use small stone-cutting edges mounted along the edges of points made of bone or antler. The former types are best known from Tachikawa Localities II and III, where stemmed and lanceolate points with basal grinding, (Yoshizaki *et al.*, 1959, pp. 43-4), such as is noted on early American specimens, are accompanied by burins possibly of the Araya type, long, trapezoidal end scrapers, and a variety of specialized and extensively retouched flake implements. Large blades are rare; microblades are not present. The reader will recall that the earliest occurrence of biface points was at Shirataki Locality 33. Another recent revision of the sequence by Yoshizaki, on the basis of burin typology, would make the point-bearing localities of Tachikawa (II and III) relatively closer to Locality 33 in time by removing Tachikawa Locality I (with microblades) from between them and making it later than Tachikawa Locality III (letter to Befu, 21 October 1960).

This brings the sequence near to its termination with the introduction of the earliest pottery-using cultures in the fourth millennium B.C. There is little

¹The Araya burin is best illustrated and described by Serizawa (1959, cf. also Serizawa and Ikawa, 1960, Fig. 8). It is distinguished by retouch on both sides of the edge which intersects the burin facet, and extensive retouch of the proximal end, presumably to prepare it for hafting.

or no continuity between any of the assemblages reviewed so far and the stone inventories of early Jomon sites. Current Japanese studies attribute two apparently unrelated groups of sites to the interval between them: a group of very simple blade tool assemblages represented by Tarukishi (Takeuchi *et al.*, 1956) and Tachikawa Locality IV, and several little-known sites which contain among other things blade arrowpoints reminiscent of earliest Jomon and Neolithic Manchuria and Siberia (Kodama and Oba, 1958; Michael, 1958, p. 37; Cheng, 1959, pp. 136-41). It should be noted that Tarukishi was once thought to be of Late Pleistocene age (Irving and Befu, 1961).

As things stand, there appear to be several separable entities in the Hokkaido pre-ceramic, some of which may be defined as traditions when analysis has been carried further. Perhaps the earliest—possibly Late Pleistocene in date—is that which includes Shirataki Localities 4, 27, and 13. It is characterized by blade industries with a range of types not unlike that found at Late Paleolithic sites in the Baikal-Yenisey region, although it is questionable whether or not the few choppers, chopping tools, and flake tools of these Hokkaido sites are closely comparable to the earliest Siberian assemblages labeled variously "Archaic" and Middle Paleolithic. A possible parallel in the Soviet Far East is the material from the lower level at Osinovka near Vladivostok, the age of which is still a matter for debate (Okladnikov, 1960). Another, probably later group of sites in Hokkaido is characterized by a relatively large number of microblades. The inventories are variable, but they do not include the geometric and crescentic microliths found in central and southern Japan. Bifaces are rare in these collections. The tongue-shaped core is a trait probably shared with the earlier blade tool assemblages, and further evidence of continuity may be found in the occasional occurrence of blade tools at microblade sites such as Tachikawa Locality I. Presumably the microblade industries of Japan are related in some way to a world-wide Mesolithic and early Neolithic technology which entailed the use of a variety of very small stone implements. Continuity with a specific facies of this phenomenon in central and eastern Asia and northern North America is indicated by the presence of tongue-shaped cores and the absence of geometric and crescentic microliths.

Assemblages such as Tachikawa II and III, with biface points and few or no blade implements, may be earlier or later than the microblade sites in Hokkaido. The presence of burins in these sites and the evidence from Shirataki Locality 30 raises questions about the relation of this group to the blade tool assemblages. Some features of these collections, such as basal grinding and extensive use and modification of flake implements, can be matched in such early American sites as Bull Brook (Byers, 1954), Long (Wheeler, MS.), and possibly Lindenmeier (Roberts, 1953).

The late blade assemblages are an enigma which cannot be penetrated at this time. The writer is inclined to question on the basis of typology the late date ascribed to Tarukishi and Tachikawa Locality IV, but does not have access to the relevant geological work.

The evidence reviewed in this paper shows no proof or even likelihood that any of the recognizable pre-ceramic traditions of northern North America is derived from a known Asian prototype. Furthermore, there is still no other clear evidence in the artifacts for actual migration between the two continents after the initial peopling of the Americas. At the same time, it must be noted

that certain traits diffused very widely, and it seems likely that trait complexes and patterns of tool use did so as well. These conclusions are in essential agreement with those of Giddings (1960a), and can be reconciled with those of MacNeish (1959a), who discusses discrete traits rather than complexes.

It is not yet clear what portion of the technological concepts on which the Arctic Small-Tool tradition is based were introduced from areas outside the Bering Sea region and northern Alaska. Clearly some of them, such as microblades, burins, a tendency toward miniaturizing, and the use of composite tools of stone and bone or antler, are part of an almost world-wide Mesolithic phenomenon, the nature of which I do not profess to understand. But this does not necessarily mean that the Arctic Small-Tool tradition developed from a single Mesolithic complex of tools exported by Siberians to Alaska. More plausible in the light of the present review is Giddings's suggestion of development in the Bering Straits region. This presupposes a pre-existing culture which had access to specializations in maritime technology as well as the innovations in stone working which affected most of northern and eastern Asia. There is no close connection between the Arctic Small-Tool tradition and any known contemporaneous or earlier typological entity in North America, but our knowledge of the archaeology of the Bering Sea region does not rule out the possibility that the antecedents to this tradition are very ancient there. When we consider that the complexes with microblade industries in Japan show parallels to the Arctic Small-Tool tradition, but no very close relationships with it, we are led to invoke the separate and gradual diffusion of traits and complexes—but not of cultures or traditions—along the Pacific and Bering Sea coasts to explain such uniformity as has been observed. The same kind of explanation suffices to account for traits shared by the Arctic Small-Tool tradition and the Baikal Neolithic, the Middle Lena, and Khatanga. It is not needed to account for traits shared by the Arctic Small-Tool and Northwest Microblade traditions which seem no more closely related to one another than is either to certain Asian cultures.

The matter of the Asian relationships of the Northwest Microblade tradition is in some respects a less tractable one. On the one hand, there is the possibility that its blades and burins are derived from older traditions in North America and are related but distantly to any Asian assemblages. On the other, the tongue-shaped core, with its widest distribution west and south of Bering Strait, would seem to have come from Asia. But if this is the case, how did the tongue-shaped core infiltrate interior Alaska without leaving evidence of its passage on the Bering and Chukchi sea coasts?

Of some interest and significance is the peculiar distribution of the trait: steppe and steppe-forest border, and maritime forest in Asia; boreal forest in western North America. In Asia, the tongue-shaped core occurs most commonly in assemblages where biface and extensively retouched unifacial tools are rare, whereas in North America the reverse is true. That it did not become established in the Arctic Small-Tool tradition (at least until relatively late) is evidence which favors both the chronological priority of the Northwest Microblade tradition and the essentially separate and independent development of these groups. A question that remains is what, if any, contributions by North American cultures to Asian inventories passed along this hypothetical route of diffusion? I would suggest, perhaps, stemmed and lanceolate points, and basal grinding.

THE CULTURE HISTORY OF THE CENTRAL BARREN GROUNDS

Elmer Harp, Jr.

This paper summarizes the results of archaeological investigations made during the summer of 1958 in central District of Keewatin, Northwest Territories, Canada.¹ The field work began with surveys around the western end of Baker Lake and was later extended farther into the Barren Grounds on a month-long, 300-mile circuit up the Thelon River to Beverly Lake and out again (Fig. 1). While operating in the Schultz Lake area we were visited briefly by the late Ralph E. Miller, M.D., of Hanover, New Hampshire, who flew me in to Grant Lake to check on the site discovered there in 1955 by the late Arthur Moffatt (Harp, 1959a).

Forty-two sites were discovered, and 4 others, previously known, worked in. They were distributed in clusters along the entire reach of our journey: 10 at the western end of Baker Lake, 12 on Schultz Lake, 9 around Aberdeen Lake, 13 on Beverly Lake, and 2 on Grant Lake. A total of 734 specimens was collected, of which about 98 per cent are chipped quartzite artifacts. The sites were mapped, photographed, and all specimens visible on the surface were collected. In most cases test trenches or pits were dug and a number of house and tent ruins were entirely excavated. There was no perceptible cultural stratigraphy in any of the sites, beyond the surface differentiation of prehistoric remains from those of recent Caribou Eskimos.

On the basis of internal evidence obtained in the field, the following observations and inferences can be made:

- (a) There were two main classes of sites: habitation areas, many of which contained tent rings or other dwelling remains, and lookout-workshop sites situated on high vantage points, such as the tops of eskers or drumlins.
- (b) The complete absence of middens and organic materials, except in the most recent sites, suggests a low numerical level of population and nomadic subsistence patterns. However, on the Barren Grounds there are good reasons why organic cultural debris has not become buried and hence protected from destructive weathering processes (Harp, 1960, pp. 81-3).
- (c) Although the sites were situated at widely varying elevations above present-day lake levels, and several were quite clearly associated with old, high beach lines, there was no consistent pattern in their vertical distribution.
- (d) All the sites were located at or near major caribou crossings at the narrows along the lakes. Therefore, it can be assumed that the exploiting of the caribou herds, by means of summer and fall hunting, was the primary subsistence orientation of their former inhabitants.

¹By the author together with Professor Robert A. McKennan and Moses Aliktikshak (E2-273), supported by grants from the Arctic Institute of North America and the Committee on Research of the Faculty of Dartmouth College.

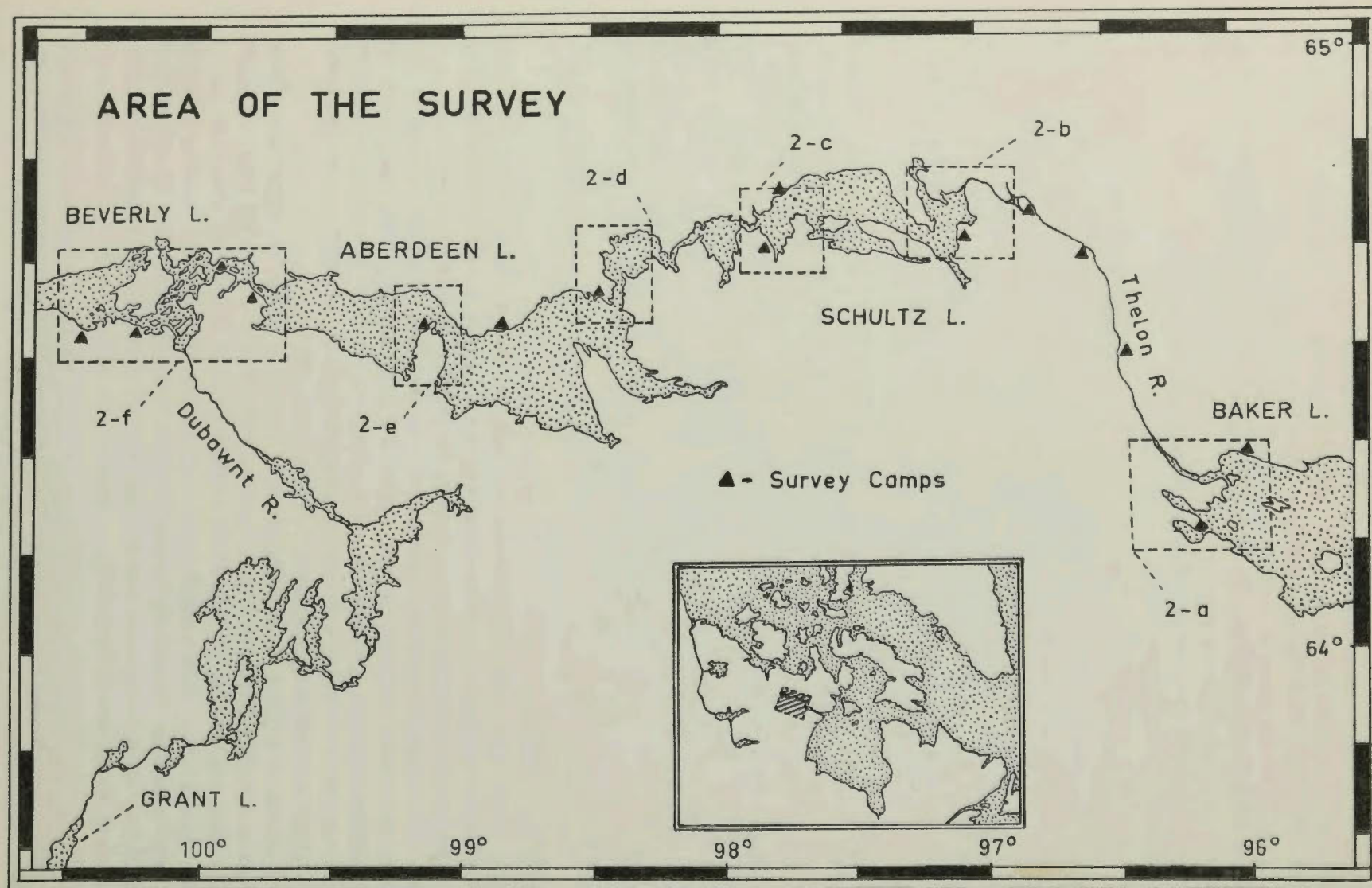


Fig. 1. Area of the survey.

(e) Analysis of the data shows that five discrete archaeological complexes were detected in the area.

(f) I have inferred that these five complexes comprise a cross-section of the past culture sequence that is probably complete (Harp, 1960, pp. 91-8).

When we trace the external relationships of the Thelon archaeological materials, I suggest that the sequence of occupation should be interpreted as follows:

Phase 1: Early Indian hunters adapted primarily to the transitional forest zone, but equipped for summer caribou hunting on the tundra. Beginning some time after 3000 B.C., discontinuous and sporadic in nature, and possibly, in later stages, coexistent or merging with Phase 3. Twelve site components are recognized: 1 at Grant Lake, 4 on Beverly Lake, and 7 on Schultz Lake.

Prominent artifact types of this phase are shown in Pl. 1: basally-ground Keewatin lanceolate points (1-4); tapered-stemmed points with lightly ground stem edges (5, 6); occasional crude burins (7, 8); thin, leaf-shaped side blades for knives (9-11); discoidal biface knives (12); asymmetric and semilunar biface knives (13-14); round-based, symmetric biface knives (15); end scrapers, triangular, with tapered stem (16, 17); a rare pick-like implement with triangular cross-section (18); large, coarse turtleback scrapers (19); and *tei-thos*, or spall scrapers (20). Other types, not illustrated, include large, heavy lanceolate points or knives, blade-end scrapers, occasional coarse prismatic blades, amorphous flake scrapers, wedge-shaped cores, numerous roughly flaked blanks (*not* chopping tools), and hammerstones.

I am aware of Krieger's (1958) terminological strictures on the use of "Agate Basin" as a proper type name for points, but for reasons cited elsewhere (Harp, 1960, pp. 105, 106) I believe it is at least partially valid. Therefore, I continue to stress it as the prototype of the Keewatin lanceolate point, and I view the close similarity between the two as evidence of a trait diffusion from the High Plains.

Other major affinities of Phase 1 are to be noted in the Artillery Lake and Taltheilei complexes (MacNeish, 1951), and narrower relationships may be seen in the New Mountain and Buckland Hills phases (MacNeish, 1959a), as well as a number of more isolated trait resemblances stretching across the northern fringes of the forest from Dismal Lake (Harp, 1958) down to the Brohm site in Manitoba (MacNeish, 1952).

The date of 3000 B.C., mentioned above, derives from C-14 sample L-428 of 5,500 years, obtained by geologists from organic material in a pingo near the Thelon River about 75 miles southwest of Beverly Lake (Craig, 1959). Central Keewatin was subjected to widespread lacustrine flooding, marine submergence, and subsequent crustal upwarping in late postglacial times, but the pingo indicates that the local physiography had approximately achieved its contemporary character as of 5,000 years ago. With this chronological marker, the archaeology suggests to me an association with the Altithermal period and an environmentally induced emphasis on the hunting of herd animals in moister and more northerly climes.

Moreover, Phase 1 seems to me to be a broad, not easily definable expression of Byers's (1959) "basic kit" concept, and I believe we see here a tradition

fundamentally based in the transitional forest, yet able to exploit seasonally the arctic tundra as well as the northern interior plains. In Keewatin we find it with a distinctive graft, the lanceolate point of Agate Basin type. I do not interpret this as a movement of Early Lithic stage or paleo-Indian hunters from the plains on to the tundra, but rather as a blend of basic subsistence patterns which, with slight adjustments, could be directed either into an ecology of bison hunting or of caribou hunting.

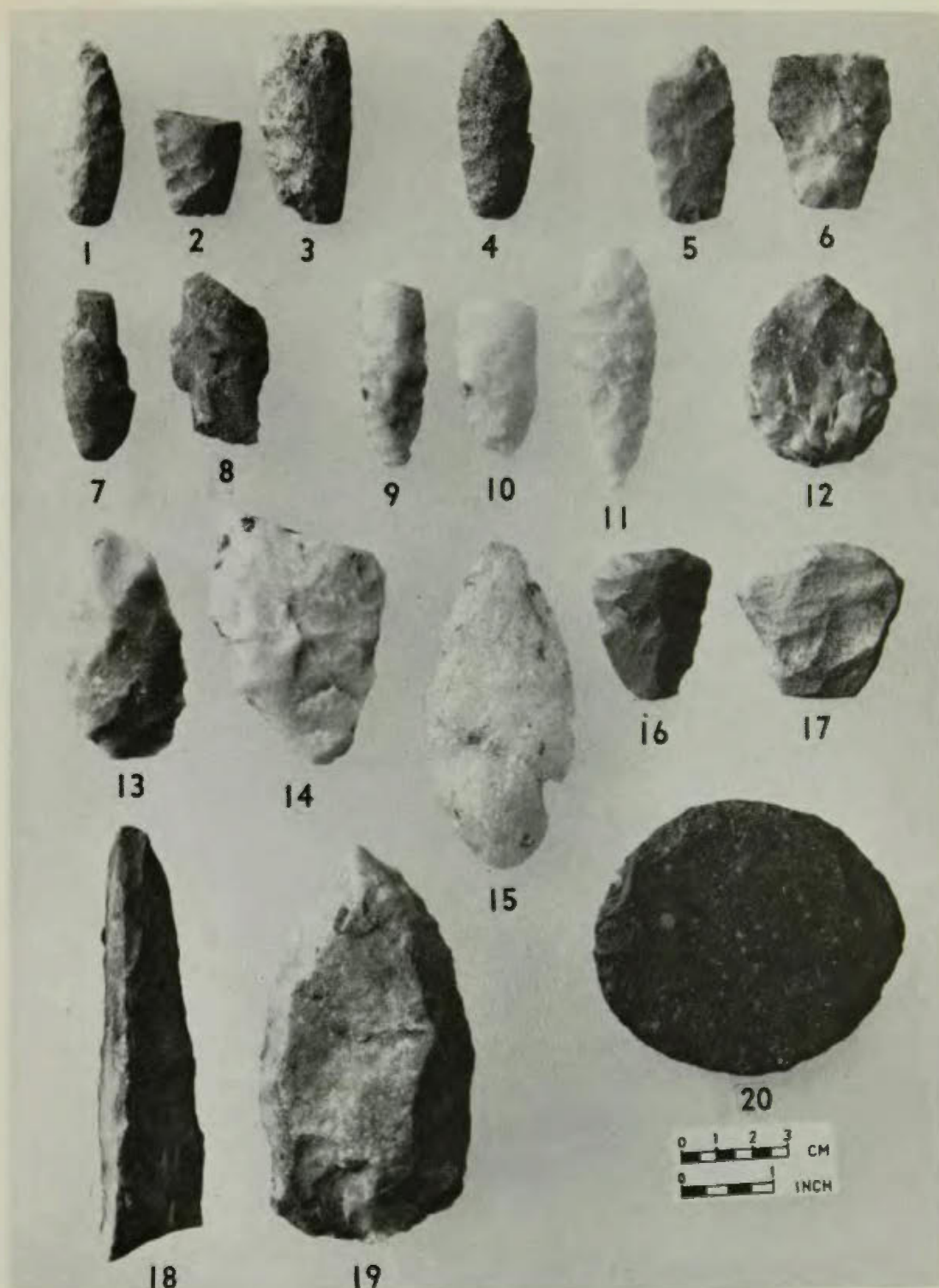
Phase 2: Pre-Dorset Eskimo culture, derived from the central Arctic. Oriented here to seasonal hunting of caribou, as one aspect of a dual economy. Estimated to have entered the country around 1000 B.C., and believed to have occupied it sporadically for several centuries. Represented in 4 (probably 5) site components at the western end of Baker Lake, with slight evidence of some penetration farther inland.

Characteristic artifact types shown in Pl. 2 include: contracted stem points (1-3); tapered stem points, some with incipient shoulders (4-8); small lanceolate points with slightly developed edge serrations and bases varying from straight to convex (9-13); a triangular point (14); rectangular or elongated side blades (15, 16); symmetric and asymmetric side and end blades for knives, expanding to large sizes that were probably hand-held (17-21); offset, or crooked end knives (22, 23); winged side blade (24); oblique end scraper (25); concavo-convex scraper (26); side scraper (27); rectangular adze blade (28); offset end scraper (29); somewhat crude prismatic blades (30); dish-topped fluted core (31); and a pebble hammerstone (32).

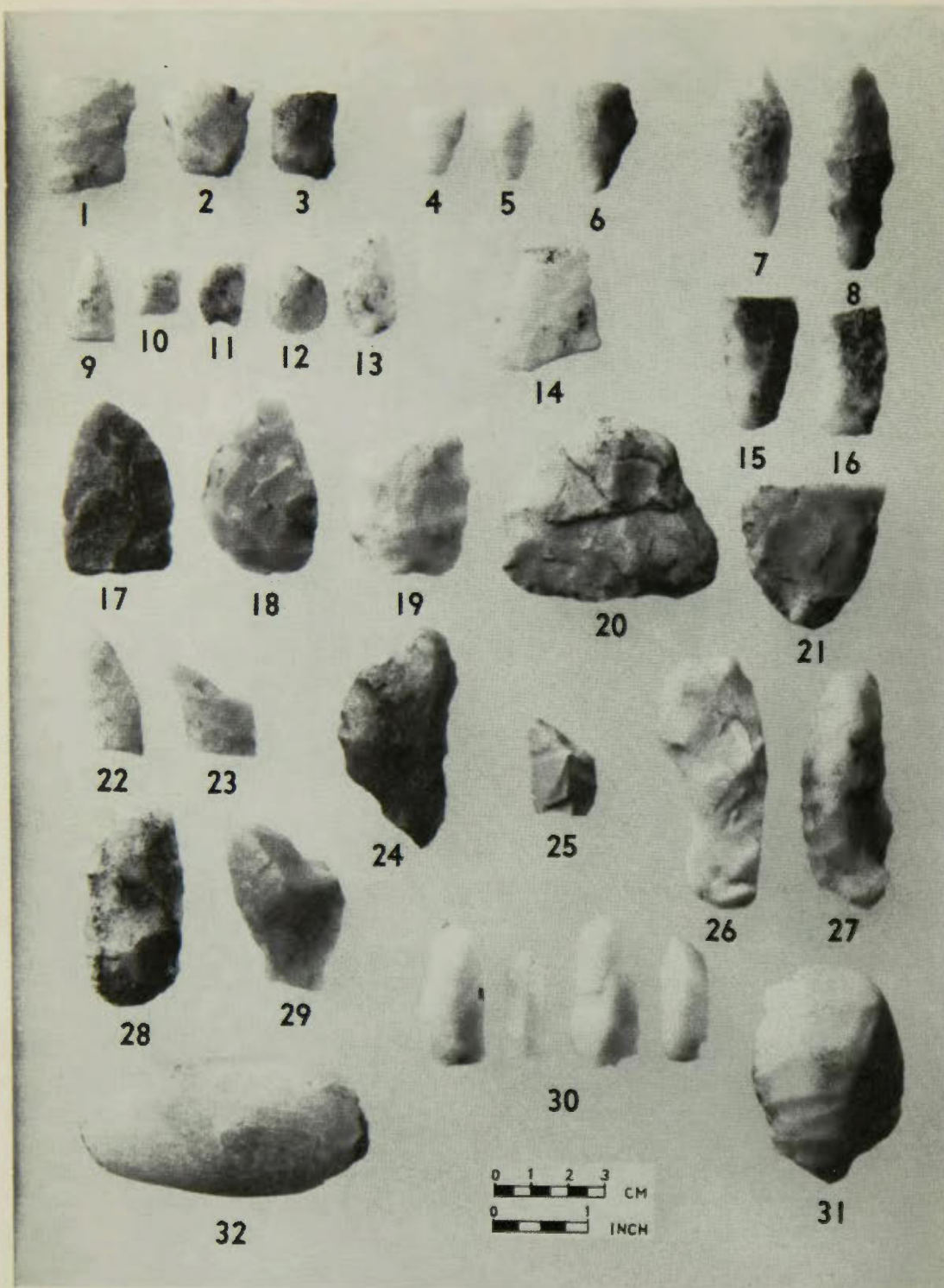
Most of these types have counterparts in Meldgaard's complex of sites in the Igloodik area (cf. Meldgaard, 1960a), specifically in the pre-Dorset occupations from 23 to 48 meters above present sea level, and a few significant likenesses to west Greenland Sarqaq materials can also be seen (Larsen and Meldgaard, 1958). However, nothing at Baker Lake suggests the complete transference of a given pre-Dorset horizon from Igloodik, and, furthermore, there are differences between the two areas. The absence of bone, ivory, and antler artifacts in the Baker Lake sites probably results from disintegration. The absence of burins there is a more serious matter, but perhaps this can be attributed to the difficulty of working with coarse-grained quartzite, which was the sole material used at Baker Lake.

There is no present possibility of exact chronological correlation between Igloodik and Baker Lake pre-Dorset horizons, but there is a tendency for my Phase 2 types to cluster in the middle to slightly later stages at Igloodik; hence, a beginning date of 1000 B.C. seems conservative for the Baker Lake manifestation. The duration of Phase 2 is unknown. One of its low-level sites, BL-16, contained a rectangular house that may have been the result of Dorset influence, but otherwise no positive Dorset artifact was discovered throughout the survey.

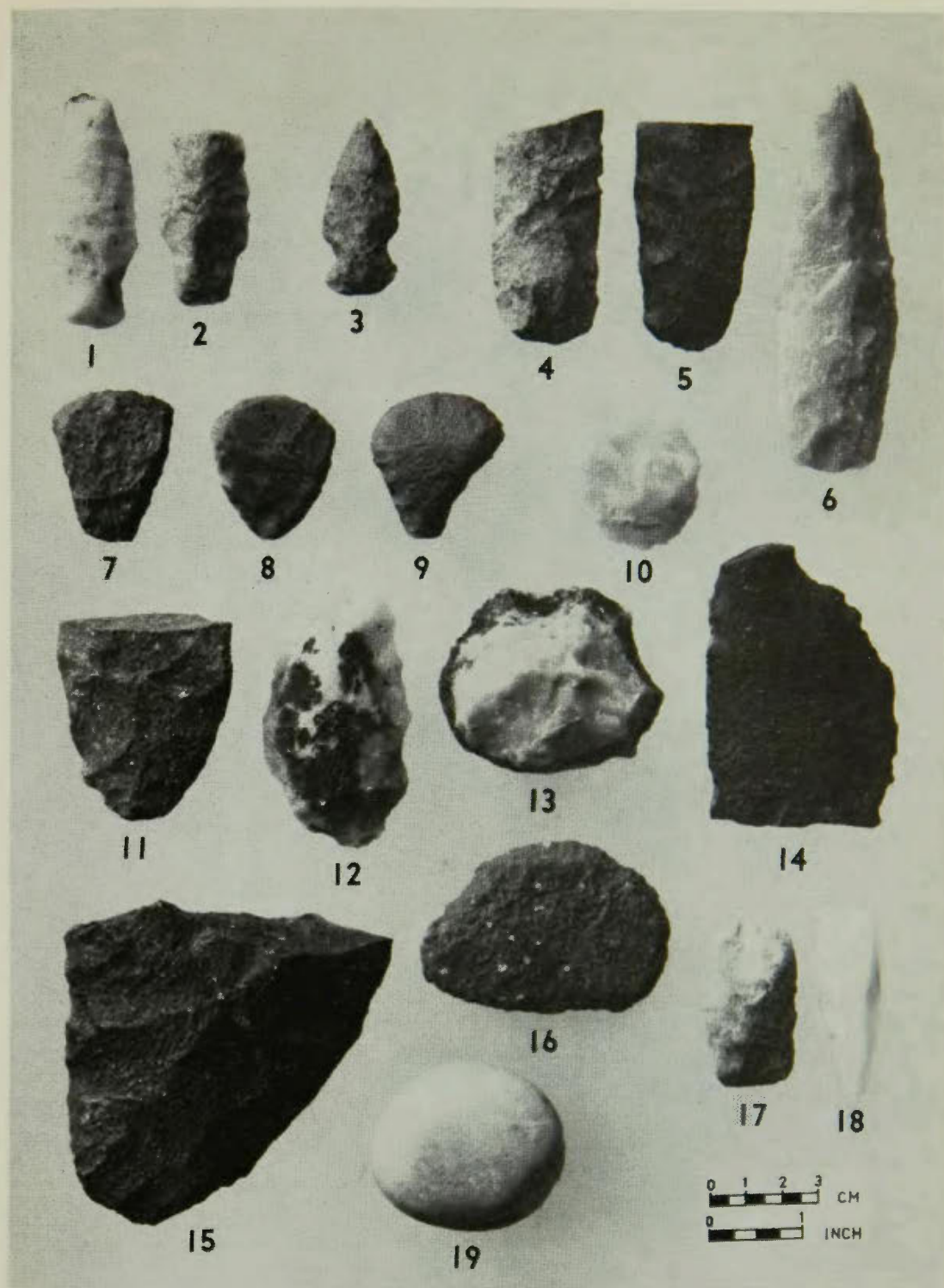
Phase 3: Archaic stage Indian hunters. Derived from the same basic interior tradition as Phase 1, and possibly largely evolved from it and other contemporaneous expressions. Also a seasonal occupation of the Thelon country, estimated by virtue of its external relationships to have occurred sporadically during the first millennium A.D. Recognized in 6 interior site components at Grant, Beverly, and Aberdeen lakes.



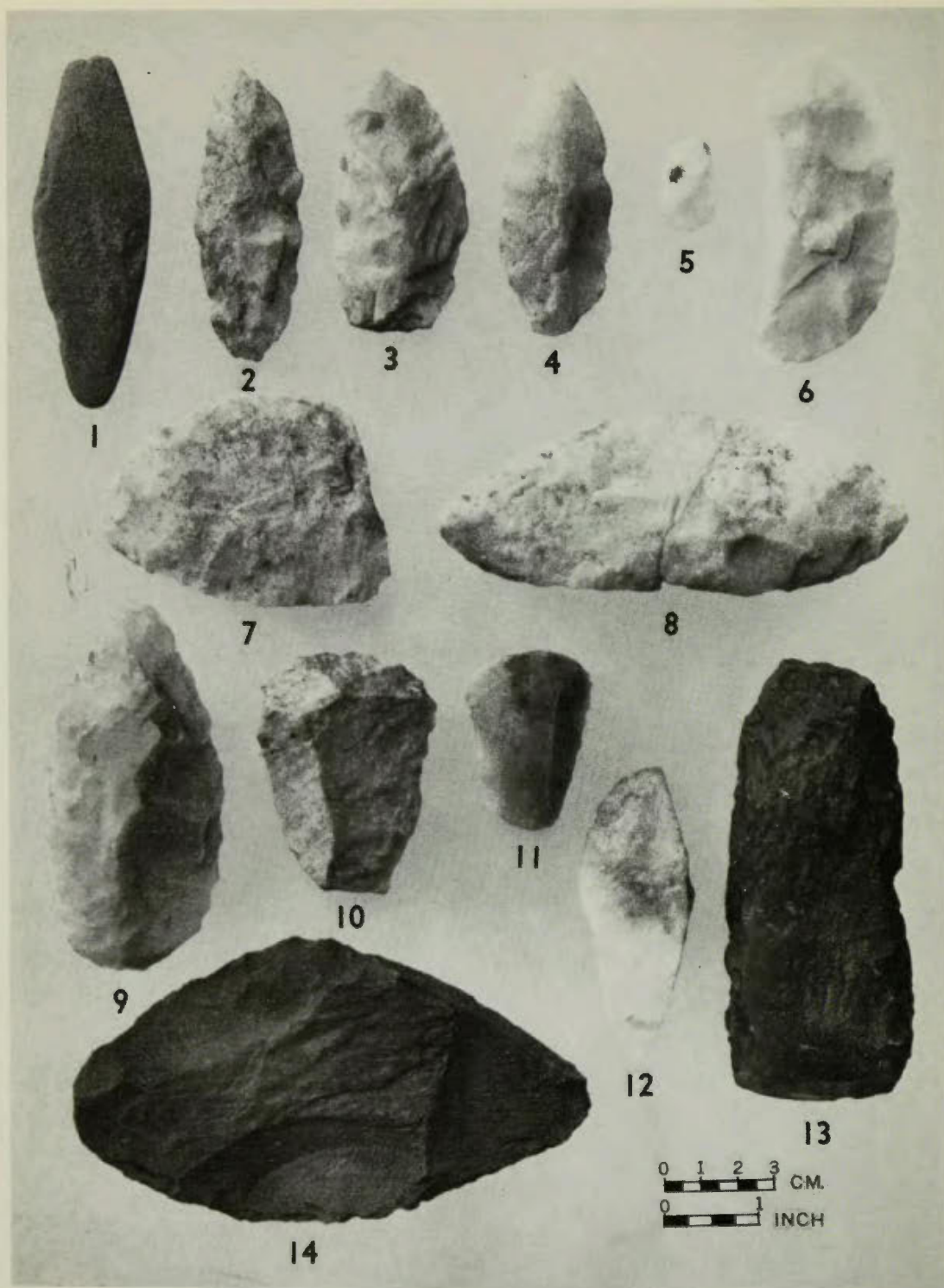
Pl. 1. Phase 1 artifact types. 1-4, Keewatin lanceolate points; 5, 6, tapered-stemmed points; 7, 8, crude burins; 9-11, leaf-shaped side blades; 12, discoidal biface knife; 13, 14, asymmetric and semilunar biface knives; 15, round-based, symmetric biface knife; 16, 17, triangular end scrapers; 18, pick-like implement; 19, coarse turtle-back scraper; 20, spall scraper or *tci-tho*.



Pl. 2. Phase 2 artifact types. 1-3, contracted stem points; 4-8, tapered stem points; 9-13, small lanceolate points; 14, triangular point; 15, 16, rectangular side blades; 17-21, symmetric and asymmetric side and end blades; 22, 23, offset or crooked end knives; 24, winged side blade; 25, oblique end scraper; 26, concavo-convex scraper; 27, side scraper; 28, rectangular adze blade; 29, offset end scraper; 30, prismatic blade; 31, dish-topped fluted core; 32, pebble hammerstone.



Pl. 3. Phase 3 artifact types. 1, 2, corner-removed points; 3, side-notched points; 4-6, large lanceolate points; 7-9, plano-convex end scrapers; 10, discoidal knife; 11, leaf-shaped biface knife; 12, asymmetric side blade; 13, discoidal or turtleback scraper; 14, large amorphous flake; 15, large biface; 16, amorphous scraper; 17, rectangular adze blade; 18, prismatic blade; 19, pebble hammerstone.



PL. 4. Phase 4 artifact types. 1, ground slate knife; 2-4, small biface knives; 5, rectanguloid side blade; 6, symmetric biface knife; 7, 8, asymmetric bifaces; 9, round-based biface; 10, 11, plano-convex end scrapers; 12, side scraper; 13, adze blade; 14, chipped slate knife (? unfinished ulu).

Key types illustrated in Pl. 3 include: corner-removed points with stem edges lightly ground (1, 2); side-notched points with convex base (3); large, heavy lanceolate points with straight to convex lateral edges (4-6); plano-convex end scrapers with straight-tapering, convex, or concave sides (7-9); discoidal knives (10); leaf-shaped biface knives (11); asymmetric side blades (12); discoidal, or turtleback scrapers (13); large amorphous flakes retouched as knives or scrapers (14); very large bifaces (15); amorphous scrapers (16), in this case not a true *tcí-tho*; rectangular adze blade (17); occasional prismatic blades (18); and pebble hammerstones (19). Other associated types include blade-end and blade-side scrapers, and tortoise cores.

Phase 3 shows affinities with Lockhart River (MacNeish, 1951); the Boyd-Barlow-Selwyn complex on the Dubawnt River (Harp, 1959a); south-east Manitoba, including the Larter, Anderson, and Nutimik foci (MacNeish, 1958); and Spence River (MacNeish, 1954). Also there are similarities to the Kamut Lake and Dismal-1 complexes (Harp, 1958), although Thelon Phase 3 lacks the influence from the Arctic Small-Tool tradition which they show. Still farther afield, we see resemblances to the Denali Highway assemblage from Alaska (Skarland and Keim, 1958).

In summary, this phase shows fundamental "basic kit" likenesses to Phase 1, yet it has distinctive differences and appears to be later in time. I suggest that we see here the beginnings of Chipewyan archaeology, or more particularly of the *Etthen-eldeli* band, the Caribou Eaters.

Phase 4: Thule Eskimo culture. A seasonal expression of their dual Eskimo economy, drawn to central Keewatin via Chesterfield Inlet for fall caribou hunting and possibly also for wood-gathering on the middle Thelon lakes. Can be dated approximately from A.D. 1200-1400. Recognized in 6 sites on Baker, Schultz, Aberdeen, and Beverly lakes.

This artifact complex is the least well defined of the Thelon materials, probably because of the absence of organic matter. Types illustrated in Pl. 4 include: ground slate knife or point (1); small biface knives with symmetric leaf-shape or asymmetric with straight base (2-4); small rectanguloid side blade (5); thin, symmetric biface knife (6); asymmetric bifaces approaching semi-lunar form (7, 8); round-based biface (9); plano-convex end scrapers retouched at end and one side (10, 11); side scraper (12); chipped and ground adze blade of silicified slate (13); and a chipped slate knife which is probably an unfinished ulu (14). Additional types include a few large prismatic blades, a hone, turtleback scrapers, amorphous flake scrapers, tortoise cores, and hammerstones.

A number of these types are repeated in sites of the central Arctic Thule culture, as well as elsewhere, but this specific relationship is significantly strengthened by the presence of Thule-type tent rings in several Phase 4 sites, and also by one associated row of *nangissat*, or hopping stones, on an island in the Beverly-Aberdeen narrows. Analysis of all available evidence concerning this latter, peculiar trait convinces me that it was indeed linked with Thule culture (Harp, 1960, pp. 120-3).

Phase 5: Caribou Eskimo culture. Represented by meager finds that are recent or, at best, protohistoric. The material content of this culture, as described by Birket-Smith (1929), was borne out in our investigations, but it

has no great archaeological depth in terms of chipped stone technology. Three associated sites yielded severely weathered specimens of bone, antler, and wood, but contained no stone culture. Six others had recent stone tent circles enclosing scattered quartzite chips and a few artifacts, all fragmentary or non-diagnostic. Eight other sites had recent tent rings with adjacent traces of chipped stone. Viewing the problem from a different angle, it was observed that half of the above mentioned recent tent ring sites had nearby associations of older culture, and on a strictly limited basis it may be said that four of them were possibly related to the Thule phase and two to the Archaic Indian phase.

Thus, although the archaeological evidence in this case is largely negative, I believe the following inferences are permissible:

- (a) We see here a phase which apparently had very little time depth.
- (b) Chipped stone technology was a relatively minor component of its total cultural inventory.
- (c) There are suggestions of relationship with the Thule phase and at least the possibility of contact with, and diffusion from, the Archaic Indian phase.

Furthermore, I think it worth suggesting that some of the sites I attributed to the Thule phase, particularly several which had no heavy stone tent rings, could well represent an indistinguishable variety of Caribou Eskimo culture.

Some of this reasoning is circular, but if we also take into account the known facts that Caribou Eskimo dialect belongs to the Inupik division of Eskimo language (Swadesh, 1951), and that Caribou Eskimo culture, as Birket-Smith (1929) has shown, includes a rich heritage of Thule culture traits, then I see only one possible conclusion. The Caribou Eskimos derived from bands of Thule people who gradually turned for increased sustenance to the rich and proven food resources of the Barren Grounds herds. As they placed added emphasis on the interior aspect of their economy they would naturally have reverted more to inland hunting practices and gradually sloughed off unneeded coastal traits. With regard to central Eskimo theory, the implications of this conclusion are obvious.

Thus we see that the central Barren Grounds have always been a marginal area, and never the center of any significant cultural developments. However, if the occupation sequence I have sketched is valid, it appears that two potential nodes for contact and diffusion existed between interior and coastal peoples in this area. The most recent of these dates from the Thule period to the present day, for during that time the Phase 3 Indians, or their derivatives, and the Thule and Caribou Eskimos could well have influenced one another. I believe that Birket-Smith's documentation of Indian traits in Caribou Eskimo culture is clear proof of this.

The second possible node encompasses the pre-Dorset phase and the Indian cultures of Phases 1 and 3, but in this purely archaeological context the facts are meager. At most I can point to two possibilities of trait diffusion: the rectangular chipped stone adze blade which may link Phase 2 and Phase 3, and the triangular pick which occurs in Phase 1 and has a counterpart in north Greenland paleo-Eskimo culture (Danish National Museum No. L1-6517). These types are sufficiently rare to warrant such an expression of interest, but alone they prove nothing.

In summary, it may be said that, although this particular aspect of the evidence from the central Barren Grounds is indecisive, we cannot yet rule out the possibility that Archaic Indian culture may have contributed something to the Dorset Eskimos through this area. Such diffusion may have developed through the medium of pre-Dorset culture there, and then have been transmitted to Dorset people who apparently adhered more closely to the coast of Hudson Bay. As for the basic likenesses between early inland and coastal cultures of the North American arctic and subarctic zones, it still appears to me that we must look back to the far northwest, and even beyond to the Old World, for the ultimate circumpolar culture elements that grew from man's ancient adaptations to life in cold climes.

THE OLD COPPER CULTURE AND THE COPPER ESKIMOS, AN HYPOTHESIS

George I. Quimby

At the present time it seems possible that the copper industry of the Copper Eskimo was the product of diffusion from the Old Copper culture of the Upper Great Lakes region, where the working of copper by cold hammering dates back some thousands of years before that of the Coppermine River-Coronation Gulf area. This is not a new idea. Dr. Diamond Jenness had a similar opinion as early as 1923.

The Indian bearers of the Old Copper culture lived in the lands bordering on Lakes Superior, Michigan, and Huron. These Indians were miners and workers of copper. Evidence of their activities is manifested by the thousands of prehistoric mining pits on Isle Royale and the Keweenaw Peninsula in upper Michigan. The Indian miners followed the veins of pure copper from surface outcrops by digging pits and breaking the copper from its rock matrix with the aid of fire and water and large beach cobbles used as hammers. They also gathered the float copper that existed as glacial erratics in the region. The copper thus obtained was transported to their villages where it was fashioned into tools and weapons.

Smelting and casting of copper were unknown. The pure copper was shaped into the intended form by cold hammering and annealing—pounding the copper into shape and heating and chilling it to keep it from becoming too brittle.

Among the tools and weapons of the Old Copper Indians were various forms of axes, gouges, adzes, chisels, knives, spear-points, awls, pikes, fish-hooks, gorges, and harpoons of copper. They also used tools and weapons of stone (see Ritzenthaler, 1957).

The Old Copper Indians made their living by hunting and fishing. The animals hunted included deer, elk, barren-ground caribou, lynx, and bison. Ducks, swans, cranes, and owls were among the birds taken. Domesticated animals were dogs of two kinds, a small dog about the size of a coyote and a large one about the size of the largest Eskimo dogs (Ritzenthaler, 1957; Spaulding, 1957).

The Old Copper culture is an ancient one in the Upper Great Lakes region. This is indicated both by radiocarbon dating and geological stratigraphy. There are for instance, at least three places where manifestations of the Old Copper culture seem to have been covered by waters of the Nipissing stage of the Great Lakes.

In the Lake Superior basin at Fort William, Ontario, Old Copper artifacts have been found under 40 feet of cross-bedded sands deposited not later than

the Nipissing stage (Quimby, 1957). Along the ship canal across Michigan's Keweenaw Peninsula are sites and locations of finds that show evidence of post-occupation erosion by the waters of the Nipissing stage. And finally, east of the Pic River at Heron Bay, Ontario, a copper gaff hook and charcoal were found beneath at least 15 feet of water-deposited clay and gravel at a position below the highest Nipissing beach about 100 feet above the present level of Lake Superior. This copper artifact and charcoal were covered by deposits laid down when the water rose to the Nipissing level at this place (see Quimby and Spaulding, 1957; Hough, 1958, p. 258).

Radiocarbon measurements from the early part of the Nipissing stage indicate a date of about 3000 B.C.: (Y-238) 2925 B.C.; (S-24) 2692 B.C.; (S-25) 2652 B.C., and (L-312) 4343 B.C. Thus some Old Copper finds seem to be older than 3000 B.C. and certainly are older than the Nipissing stage of the Great Lakes.

Radiocarbon measurements of Old Copper sites range between 5550 B.C. and 1080 B.C. Some measurements are: (C-837 and 839) 5550 B.C.; (C-836) 3695 B.C.; (M-371E) 1840 B.C.; (M-644) 1700 B.C., and (M-658) 1080 B.C. The younger dates in this range are from measurements of bone that may have been contaminated by more recent Carbon-14. A consideration of both radiocarbon dates and geology suggests a period of about 4000 B.C. to 1500 B.C. for the Old Copper culture in the Upper Great Lakes region.

During the times of Old Copper occupancy the Upper Great Lakes region seems to have been very different from what it is today. Before 3000 B.C. the lake levels were hundreds of feet lower. In the Michigan basin Lake Chippewa was 350 feet below the present lake level; in the Lake Huron basin Lake Stanley was 400 feet beneath the present lake level; and the waters in the Lake Superior basin were much lower than at present. Lake Chippewa drained into Lake Stanley by means of a long river through what is now the Straits of Mackinac. Lake Stanley drained to the Atlantic Ocean by way of the Ottawa River through the North Bay outlet which at that time stood nearly at sea level.

Before 3000 B.C. there were two additional large lakes in the region. To the northwest lay glacial Lake Agassiz which drained eastward to the Superior basin and to the northeast were the remnants, at least, of glacial Lake Barlow-Ojibway which at its maximum was a tremendous body of water caught between the ice front and the height of land.

Artifacts representative of the Old Copper culture have been found on beaches of glacial Lake Agassiz in Minnesota suggesting that some Old Copper Indians may have lived on the shores of this lake (Dr. Louis Powell, personal communication).

In the early period of Old Copper occupancy spruce and fir dominated the northern part of the Upper Great Lakes region and pine was expanding in the southern portions. Animals living in the region included deer, elk, bison, lynx, beaver, and barren-ground caribou. Occasional whales may have entered the Huron basin from the Atlantic by way of the North Bay outlet, as whale remains have been found in a Nipissing stage beach deposit.

About 3000 B.C. or slightly earlier the land in the northeastern part of the region was upwarped some 500 feet closing the North Bay outlet and causing the rise in water levels that inaugurated the Nipissing stage that lasted from slightly after 3000 B.C. to about 1500 B.C.

The amount of rise in the Lake Superior basin is not known, but it must have been considerable. The water in the Lake Michigan basin rose 375 feet and the level in the Lake Huron basin rose at least 425 feet to a single body of water about 25 feet above the present level in these basins.

During the Nipissing stage the climate was much hotter than at present or at any other time during the last 18,000 or more years. Forests dominated by oak and hickory reached their maximum northward extension and the pine and spruce stands were pushed even farther northward too. This was the time of the greatest extent of grasslands in eastern North America.

The Old Copper culture, as such, disappeared from the Upper Great Lakes region by about 1000 B.C. or perhaps slightly earlier. One of the factors in its disappearance must have been the northward retreat of the boreal forest following the retreat of the ice. Northernmost Old Copper sites in the Upper Great Lakes region are more recent than the southern ones. There are, for instance, finds of Old Copper artifacts on the bed of glacial Lake Agassiz in Manitoba (James B. Griffin, personal communication), which must postdate the lake and are much later than artifacts from the earliest sites in Wisconsin, because the bed of glacial Lake Agassiz probably was not available for occupancy during the earlier stages of Old Copper culture.

It seems reasonable to believe that as their accustomed type of forests and animals retreated northward after 3000 B.C. some of the Old Copper Indians moved northward too. Their old homeland must have presented many problems in terms of changing climate, water levels, available land areas, and topography. Moreover, like other primitive cultures based on a hunting economy the Old Copper culture must have been closely tied to its environment through the interaction of habitat and culture. The northward movement of ecological zones and, presumably, some of the Indians should have increased in intensity between 3000 and 1000 B.C. as the full effects of the hot climate of the altithermal or hypsithermal interval became manifested.

The trail of the Old Copper Indians disappears in Canada directly on the line of march between Lake Superior and Coronation Gulf. Copper artifacts of Old Copper style have been found at Lac Seul (Quimby notes) and in the vicinity of The Pas (R. S. MacNeish, personal communication). The Pas is about midway between Oconto, Wisconsin and Bathurst Inlet in Coronation Gulf.

How late the Old Copper culture may have persisted in this area is not known. Samuel Hearne, following reports of copper artifacts among the Indians and Eskimos, travelled from Churchill to the mouth of the Coppermine River in A.D. 1771. Hearne (1795, pp. 161, 168-9) describes bayonets, knives, adzes, ulus, ice chisels, awls, and arrowheads of copper. He also described the shaping process of cold hammering and annealing as follows: ". . . by the help of fire, and two stones, they [Indians] can beat it [copper] out to any shape they wish." (Hearne, 1795, p. 175).

Dr. Diamond Jenness (1923, p. 550) concludes that the ". . . copper culture of the northern Indians in the seventeenth century was many generations old even at that period" and that "the Indians were the first to learn the use of copper, and the Eskimos borrowed it from the Indians." Jenness believed "that the Copper Eskimos came about five centuries ago from the east to Coronation Gulf and in that region, through contact with the Indians, acquired

the copper culture which marks them off from other Eskimos". Birket-Smith (1936, p. 139) seems to be in essential agreement with Jenness. Mr. Graham Rowley kindly pointed out to me that copper artifacts were present in the Thule site of Naujan and in the late Dorset site of Abverdjar. These facts raise the possibility that Eskimo cultures were acquiring copper traits from the Indians even earlier than originally suggested by Dr. Jenness, perhaps around A.D. 1000.

A glimpse of the copper culture of the historic Copper Eskimo is provided in a brief report by Cadzow (1920) and a small collection in the Chicago Natural History Museum.

Some of the copper traits shared by Copper Eskimo and the Old Copper culture are ulus or crescent-shaped knives, tanged knives with wide bevel, tanged projectile points with wide bevel, adzes, needles, gaff-hooks, fish-hooks, pikes, awls, and use of rivets. Some copper foreshafts and center points for fish spears of the Copper Eskimo are similar to some so-called awls of the Old Copper culture. Some of the large pikes of the Old Copper culture closely resemble picks of the Copper Eskimo. Such implements were attached to a wooden handle and swung like a small pickaxe. Probably more similarities could be found by further search of Copper Eskimo collections.

Summary

1. In the Upper Great Lakes region the Old Copper Indians had developed an elaborate copper industry prior to 3000 B.C. and perhaps as early as 5000 B.C.
2. As the postglacial climate became warmer, the forest zones moved northward.
3. Some groups of Old Copper Indians moved northward with the zones to which they were adjusted economically and socially.
4. Although the Old Copper culture had disappeared from the Upper Great Lakes by about 1000 B.C., Old Copper traits persisted in the interior of Canada between Manitoba and Coronation Gulf and between Hudson Bay and Great Slave Lake, where the habitat and culture were similar to what they had been in the Upper Great Lakes region a few thousands of years earlier.
5. Sometime around A.D. 1000, Eskimos entering the Coronation Gulf region borrowed the copper traits from the Indians and used some of the same sources of raw copper.
6. Thus in North America there was an aboriginal copper tradition, adjusted to northern ecological zones, that lasted from 5,000 to 7,000 years.

PRE-DORSET OCCUPATIONS AT IVUGIVIK IN NORTHWESTERN UNGAVA

William E. Taylor, Jr.

The material to be described here was collected in 1959 by a National Museum of Canada field party consisting of the writer and several Eskimos. It comes from sites at Ivugivik ($62^{\circ} 25'N.$, $77^{\circ} 54'W.$), a settlement near the northwest extremity of Ungava Peninsula in the northern part of the province of Quebec. The sites are immediately north of the Ivugivik settlement and on a large rock hill that forms the west shoulder of the harbor. They are the Meeus site, the Pita site, and the Mungiok site.¹

The sites

The Meeus site begins about 1,200 feet northwest of the Roman Catholic Mission building and extends northeast for some 1,800 feet. The maximum width over which material occurred was 600 feet. More precisely, within this 600- by 1,800-foot oval, a thin scattering of lithic reject material and artifacts lay on the surface of the sparsely vegetated, moss-grass patches. The archaeological material was restricted to the small, nearly level, vegetated patches separated by the rock outcrops that crown the hill. Material occurred at elevations between 105 and 139 feet above sea level. The site generally is on a south- and east-facing slope overlooking the present settlement. Near the southwest edge of the site area, at 124 feet above sea level, were two faint house depressions by which the site was first found. During the 1959 thaw, an Eskimo of our 1958 crew recognized the depressions as houses. He dug them completely and, in the destructive process, found in them 4 chert burins and other fragments. The depressions were slightly overlapping, about 15 feet each in diameter, and appeared to have been circular. Retrowelling the debris yielded a few more specimens but very scant reject material. The initial collection, given me by the son of the finder, includes a typical chert burin-like tool of Dorset culture; it likely came, not from the Meeus site, but from a nearby Dorset site excavated in 1958. Although the general surface scatter of specimens showed no marked concentrations, several test-pits were dug on the site, most of them adjacent to the house depressions. All pits, but one, were non-productive. A single test-pit, 30 feet in front of the houses, yielded 6 small chert reject flakes and 40 badly decayed bone fragments. Twelve of the latter

¹The Meeus site name expresses my indebtedness to the Rev. Joseph Meeus, O.M.I., who made valuable contributions to the 1959 work at Ivugivik and on Mansel Island. The Pita and Mungiok site names reflect my gratitude to members of the 1959 crew for their patience, diligence, and hospitality.

were identified as seal bones. The very rare occurrences of animal bone fragments on the surface of the site cannot, because of the adjacent dog population, be ascribed to the prehistoric site occupation. All artifacts recovered are surface specimens.

The Pita site is about 3,000 feet north of the mission. It is immediately east of the north end of a large pond that drains northeast through a rock-shouldered valley to the sea. This very small site, about 450 by 120 feet, occupies a grass-moss vegetation patch set against the solid rock rim of the valley. The site faces south and east to the pond and the narrow valley. The Pita site is about 1,100 feet north of the northeast limit of the Meeus site. Its elevation is between 115 and 125 feet above sea level. No structural features were noticed. As at the Meeus site, the site is defined by a very thin scatter of artifacts and lithic reject material on the surface. Several test-pits were dug with discouraging results. Two test-pits produced 89 rotted bone fragments including 1 walrus bone and 9 seal bones. All the test-pits combined yielded a few tiny chert flakes and 5 artifact fragments. All other materials were from the surface.

The Mungiok site, between 115 and 127 feet above sea level, rests in a thinly vegetated, rather uneven area between two rock crowns. The more southwesterly of these divides this site from the northeast extremity of the Meeus site, some 600 feet to the southwest. The Mungiok site area gently slopes to the northwest almost facing the Pita site, approximately 1,100 feet northwest of it. The site area, delineated by a very sparse scatter of stone reject material and artifacts, is about 240 by 300 feet. Only stone material was found, all of it on the surface. No structural features were noted.

Two small Dorset culture sites stand nearby on the same rocky point of land at Ivugivik. One of them, the Ohituk site, is of early Dorset time (Taylor, 1960) and stands 61 to 69 feet above sea level. The second, Eeteevianee, is of middle Dorset time, and stands between 39 and 45 feet above sea level (Taylor, 1959a). Several other Dorset site elevations, five of them from early Dorset sites on Sugluk Island to the east and Mansel Island to the southwest, support the implication of Ivugivik site elevations: that the Meeus, Pita, and Mungiok sites represent pre-Dorset occupations. Since these three are in similar contexts, at very similar elevations, very near each other, and with generally similar, if small, inventories, it seems reasonable to treat them as representatives of a single stage of the pre-Dorset period.

The artifacts

Ninety-four per cent of the artifacts are chert in various colors, light gray predominating, fawn to light brown being much less common, and rarely an example of very dark gray, fine-textured chert occurs; one typical Dorset chert piece was found. The remainder is of quartz crystal, amorphous quartz, slate, and sandstone. All the 217 specimens described below show evidence of flaking by use, percussion, pressure retouch, or combinations of these techniques. Excluding the one Dorset tool, 3 specimens, 1.4 per cent of the sample, show evidence of grinding. These pieces are chert, sandstone, and slate. Further, the chert specimen is a burin. There are 52 burins of all types, 23.9 per cent of the sample. The burin industry in all comprises an impressive 37.8 per cent of the total. Blades and microblades provide 13.3 per cent of the sample. Biface end blades,

Table 1 Distribution and frequency of artifacts.

	Meeus site		Pita site		Mungiok site		Totals	
	No.	%	No.	%	No.	%	No.	%
Burin industry								
Burin	40	25.5	5	16.1	5	17.2	50	23.0
Burin on an end-of-the-blade scraper	1	0.6	—	—	—	—	1	0.5
Burin blank	1	0.6	—	—	1	3.4	2	0.9
Burin spall	19	12.1	6	19.3	4	13.8	29	13.4
Other bifaces								
End blade, triangular	3	1.9	2	6.4	—	—	5	2.3
End blade, contracting stem	1	0.6	—	—	1	3.4	2	0.9
End blade, long-stemmed	1	0.6	—	—	—	—	1	0.5
End blade, straight stem	—	—	—	—	1	3.4	1	0.5
Blade fragments	22	14.0	3	9.7	2	6.9	27	12.4
Side blade	2	1.3	—	—	—	—	2	0.9
Blade fragments, asymmetrical	3	1.9	—	—	—	—	3	1.4
Other unifaces								
End scraper, fragments	—	—	—	—	2	6.9	2	0.9
Flake, retouched	7	4.4	2	6.4	4	13.8	13	6.0
Flake perforator	—	—	1	3.2	—	—	1	0.5
Blade, retouched	3	1.9	1	3.2	—	—	4	1.8
Microblade	19	12.1	2	6.4	4	13.8	25	11.5
Flake, used	24	15.3	6	19.3	3	10.3	33	15.2
Core fragments	3	1.9	—	—	—	—	3	1.4
Artifacts of quartz	5	3.2	1?	3.2?	2	6.9	8	3.7
Artifacts of slate and sandstone	3	1.9	2	6.4	—	—	5	2.3
<i>Totals</i>	<i>157</i>	<i>72.4</i>	<i>31</i>	<i>14.3</i>	<i>29</i>	<i>13.4</i>	<i>217</i>	

side blades, and fragments of such objects comprise 18.9 per cent of this collection. Uniface categories are 35.9 per cent of the sample. End scrapers are remarkably rare, only 1.8 per cent, while cores are only 1.4 per cent of the total. The few other accounts of eastern Arctic pre-Dorset material generally exclude the used and retouched flake categories in computing frequencies. Their inclusion here depresses the frequencies of other categories. If they, and a few of the "other materials" category artifacts, were ignored, the burin frequency would appear as 30.8 per cent, not 23.9 per cent, while blades and microblades would appear as 17.1 per cent, not 13.3 per cent.

Burins, chert (50): The Meeus site produced 40 burins, all of chert. Of 36 specimens which can be so divided, 9 are completely uniface, 22 are incompletely biface, and only 5 are completely biface. The tendency to unifaciality is quite marked since many of the incompletely biface examples have only scant retouch over the bulb of percussion. Often the spalling or upper edge on these specimens has only unifacial retouch. The single instance of grinding on a burin (Pl. 1, 20) covers an area of 9 by 10 mm. on one side of a biface burin and is adjacent to the burin spall scar. There are from one to seven spall scars on each specimen. Cross-sections are quite variable including quadrangular,

triangular, thin biconvex, and thick plano-convex forms. While many of these burins were made on flakes, at least a few are re-formed blades. Most of the burins are, in plan, quadrangular, sub-rectangular, or roughly ovate. However a few, including 8 of the convex-scaled type, show in slight or marked degree, a lateral flare to the margin of the specimen at the upper extremity opposite the spalled surface¹ (Pl. 1, 8-12). On 6 of these, as well as on several other specimens, the margin of the burin extending outward from the hinge fracture of the spall has been retouched¹ (Pl. 1, 11, 15).

The burins range in length from 1.4 to 3.4 cm. and average 2.3 cm. Widths vary from 9 to 21 mm., averaging 13 mm. Thickness ranges from 2 to 6 mm. and averages 4.3 mm.

Noone's classification (1934) is followed here for descriptive brevity. Since, however, nine of his sixteen burin types rely on vertical spalls and, since oblique spalling occurs on all but a few of these specimens, one must for precision refer to Noone's Table 2 (1934, pp. 85-6), which incorporates the oblique, multiple, and skewing attributes so common in this collection.

The Meeus burins include 7 multiburins. Six are of the rectangular-scaled type (Pl. 1, 1-4), 3 of which show multiple spalling. In only 1 of the 6 is the spall angle vertical rather than oblique. The seventh is of the spalled order, convex type (Pl. 1, 5); six consecutive, slightly oblique spalls have been struck from two diagonally opposite corners. It is an ordinary twin type whereas the preceding 6 are all Siamese twins.

Of the Meeus single burins only 3 are of the spalled order. One of these is convex type (Pl. 1, 6), and 1 of the 2 central type approaches the form of the convex type (Pl. 1, 7). Of the 24 single burins in the scaled order, 15 are convex-scaled type (Pl. 1, 8-17). One of these has multiple vertical spalls. Five scaled order burins are of the bevel-scaled type (Pl. 1, 18, 19). All the 5 have oblique spalls and 4 of them are multi-spalled. Four of the scaled order burins are rectangular-scaled type (Pl. 1, 20, 21). One has vertical spalls, 3 have oblique spalls, and all 4 are multi-spalled. One of these is the ground specimen mentioned above. The remaining 6 burins, 5 of them fragments, are unclassified.

The 5 chert burins from the Pita site include 2 convex type of the spalled order, both with oblique spall scars (Pl. 1, 33, 34). Both of these tools are uniface. One has been spalled twice. The 3 of the scaled order belong in the bevel-scaled type although 2 are spalled obliquely (Pl. 1, 35, 36). They are incompletely biface. Two of them are multi-spalled. None of the 5 show the lateral flare noted for some Meeus site specimens. One shows retouch on the edge extending outward from the hinge fracture of the spall. Cross-sections are triangular to plano-convex. Lengths range from 1.7 to 2.4 cm. averaging 2.1 cm. Widths vary between 7 and 12 mm., averaging 10 mm. Thickness ranges from 3 to 4 mm. and averages 3.4 mm.

There were also 5 burins in the Mungiok site sample. One uniface specimen is a multi-spalled multiburin, a Siamese twin form of the rectangular-scaled type (Pl. 1, 40). One incompletely biface broken specimen is of the rectangular-scaled type (Pl. 1, 41). Two others, one uniface and one completely biface, belong to the convex-scaled type (Pl. 1, 42, 43), but are the obliquely spalled variants of the type. Both are multi-spalled. The fifth specimen is

¹This also occurs on a few Denbigh Flint complex burins examined at the Haffenreffer Museum of Brown University.

unclassified. It was made on what might be a malformed microblade (Pl. 1, 44). There is slight retouch at its bulbar and distal ends. A single, short, vertical, burin spall was removed from the distal end. This specimen is 2.6 cm. by 6 mm. by 2 mm. The measurements of the other 3 complete specimens are respectively 3.0, 2.5, and 2.3 cm. for length, 1.3, 1.7, and 1.1 cm. for width, and 6, 5, and 4 mm. for thickness. One specimen, the Siamese twin, shows the lateral flare. One other has the retouched edge extending outward from the hinge fracture.

In these 3 samples, involving 50 burins, it has been exceedingly difficult to distinguish between the bevel- and convex-scaled types. With several specimens I have been quite subjective, especially with those on which spalling has almost completely removed the diagnostic line of scales. While trying here to retain consistency with Noone's system, it would be imprudent to place much weight on the subdivision made here of the 30 burins of the convex-, bevel-, and rectangular-scaled types.

Burin on a burin spall, chert (1): This specimen is described below in the category of burin spalls.

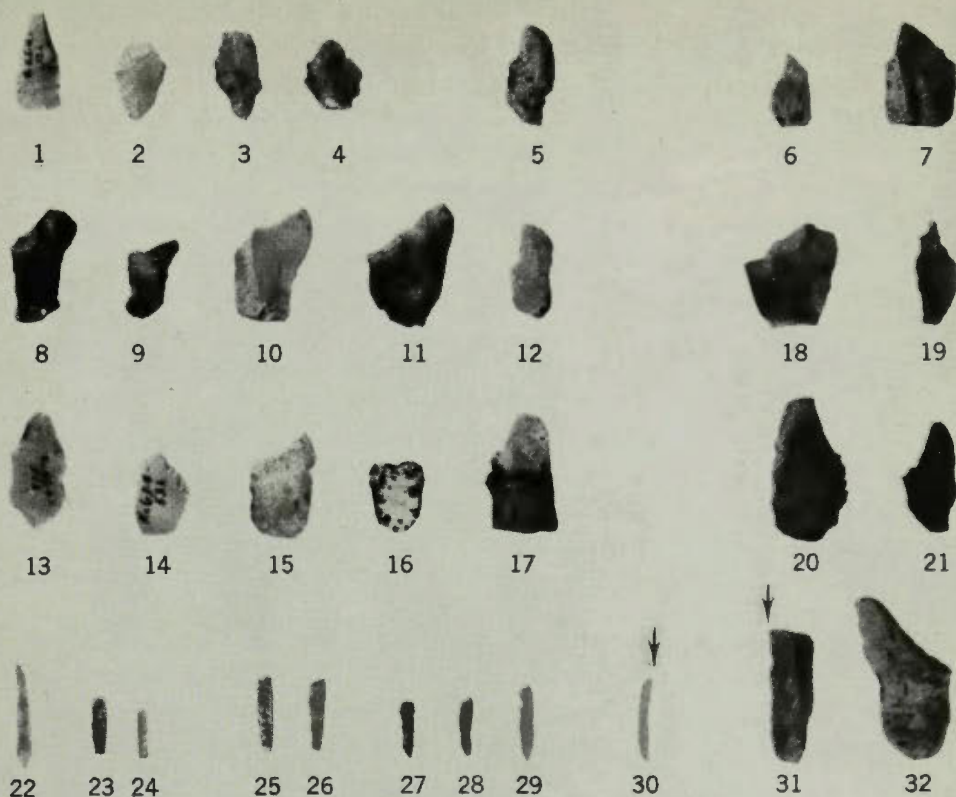
Burin on an end-of-the-blade scraper, chert (1): This Meeus site artifact is 3 cm. long, 1 cm. wide, and 4 mm. thick. Its dimensions have been reduced by unifacial pressure retouch along the sides and across the tip. The forward end has been diligently retouched by intentional and use scars to produce a very steep, slightly concave, end scraper edge. The cross-section is triangular. The longitudinal section is gently concavo-convex. A single burin spall 9 mm. long has been removed from a corner of the scraping end of the tool to produce a burin of the rectangular-scaled type (Pl. 1, 31).

Burin blanks, chert (2): A specimen from the Meeus site is almost certainly a blank ready for the first burin blow. It is completely retouched on its upper surface but shows only minimal edge retouch on its bulbar surface. It has marked lateral flare. The edge extending outward from the expected hinge fracture point is carefully retouched. Had the burin-making process been completed this artifact would likely have become a member of the rectangular-scaled type. Since the oblique edge that would have been spalled shows steep, diligent retouch, this artifact might have served as a concave side scraper, a tool type known in other pre-Dorset assemblages. The 4 cm.-length of the artifact supports such an identification. It is 1.7 cm. wide and 5 mm. thick (Pl. 1, 32).

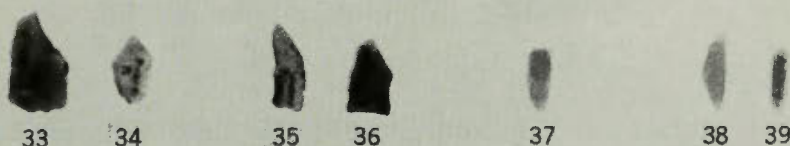
The Mungiok site produced a similar object except that it lacked the lateral flare, and had abundant edge retouch on its bulbar surface. The size and shape of this artifact strongly suggest it is a burin blank. It is 2.9 cm. long, 1.5 cm. wide, and 3 mm. thick (Pl. 1, 45).

Burin spalls, chert (29): The Meeus site sample contains 4 primary and 15 secondary burin spalls. The former have a thick, triangular cross-section and the edge retouch of a uniface or incompletely biface burin. The latter have a thick to thin quadrangular cross-section, and, in almost all cases, both the negative and positive bulbs of percussion expected on secondary spalls. Fifteen complete examples were measured. Lengths range from 11 to 24 mm. and average 16 mm. Widths vary from 2 to 4.5 mm., averaging 3.1 mm. Thickness

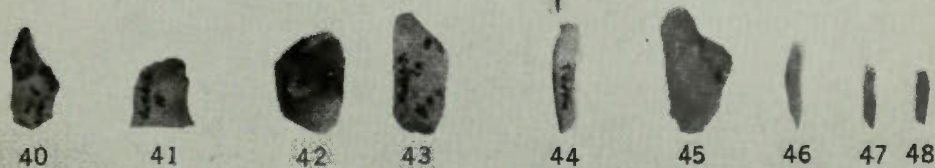
SCALE 0 1 2 INCHES
0 5 CENTIMETERS



MEEUS SITE, IVUGIVIK, UNGAVA, PRE-DORSET

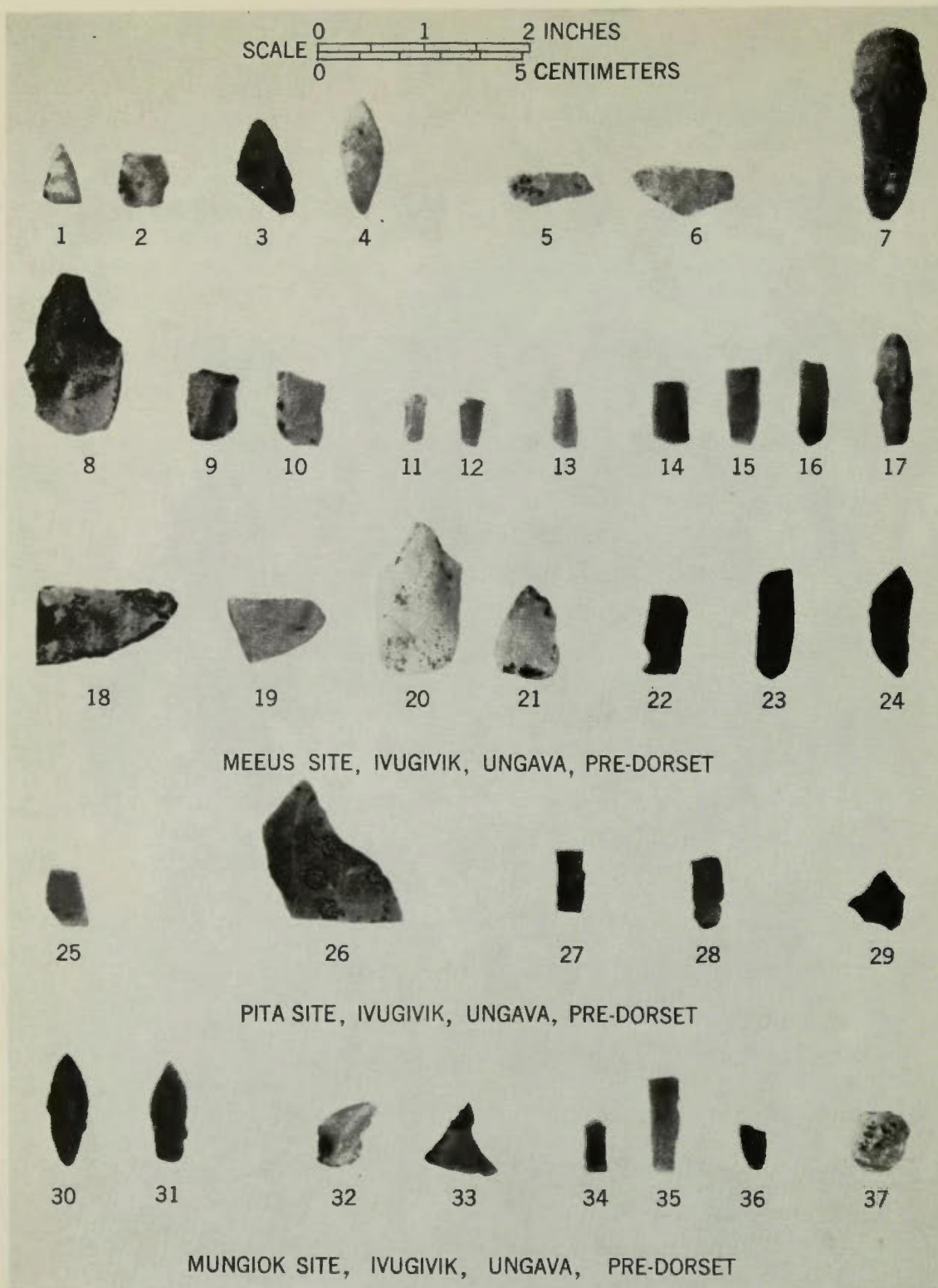


PITA SITE, IVUGIVIK, UNGAVA, PRE-DORSET



MUNGIOOK SITE, IVUGIVIK, UNGAVA, PRE-DORSET

Pl. 1. Artifacts from Ivugivik. 1-4, rectangular-scaled multiburins; 5, 6, convex-spalled burins; 7, central spalled burin; 8-17, convex-scaled burins; 18, 19, bevel-scaled burins; 20, ground rectangular-scaled burin; 21, rectangular-scaled burin; 22-4, primary burin spalls; 25, 26, second burin spalls, unworked; 27-9, secondary burin spalls, worked; 30, burin on a burin spall; 31, burin on an end-of-the-blade scraper; 32, burin blank; 33, 34, convex-spalled burins; 35, 36, bevel-scaled burins; 37-9, secondary burin spalls, worked; 40, rectangular-scaled multiburin; 41, rectangular-scaled burin; 42, 43, convex-scaled burins; 44, burin (on a microblade?); 45, burin blank; 46, secondary burin spall, unworked; 47, 48, secondary burin spalls, worked.



Pl. 2. Artifacts from Ivugivik. 1-3, triangular end blades; 4, contracting stem end blade; 5, 6, side blades; 7, long-stemmed end blade; 8, core fragment; 9, 10, blades, retouched; 11, 12, microblades, retouched; 13, microblade, used; 14-17, microblades; 18, unfinished side blade fragment (?); 19, side blade fragment (?); 20, knife blade, quartz; 21, end blade stem (?), quartz; 22, burin-like tool, Dorset culture; 23, slate flake, ground; 24, sandstone object, ground; 25, triangular end blade; 26, perforator; 27, microblade; 28, microblade, retouched; 29, slate flake, retouched; 30, contracting stem end blade; 31, straight stem end blade; 32, 33, end scraper fragments; 34, microblade; 35, microblade, retouched; 36, microblade, used; 37, quartz fragment, retouched.

ranges from 1.5 to 2.5 mm. and averages 2 mm. One of the primary spalls shows minute use scarring at both ends (Pl. 1, 22). Three of the secondary spalls show such flaking across the hinge fracture end (Pl. 1, 27-9). Two other secondary spalls have minute use scars, not at the tip, but along one side of the bulbar surface. One of the secondary spalls with tip retouch has had a burin spall removed from its hinge fracture end. This spall scar is 6 mm. long and 1 mm. wide (Pl. 1, 30). This specimen measures 20 by 3 by 2 mm.

The Pita site yielded 6 secondary burin spalls, all with quadrangular cross-sections and the expected negative and positive bulbs of percussion. Length ranges from 9 to 17 mm. and averages 15 mm. Width varies from 2 to 5 mm., averaging 3.7 mm. Thickness ranges from 1 to 3 mm. and averages 2 mm. Three of these spalls show minute use retouch on the hinge fracture end (Pl. 1, 37-9).

On the Mungiok site, 4 secondary burin spalls were found, all quite like those from the other sites. Length runs from 12 to 21 mm. and, again, averages 15 mm. Widths vary from 2 to 3 mm., averaging 2.2 mm. Thickness ranges from 1 to 2 mm., averaging 1.5 mm. One specimen shows minute use scars on its hinge fracture tip (Pl. 1, 47).

End blades, biface, triangular, chert (5): The Meeus site sample includes 3 straight-base, triangular end blades (Pl. 2, 1-3). They are well retouched, have very slightly convex sides, a slight tendency to edge serration, and thin lenticular cross-sections. Available lengths are 1.4 to 2.4 cm. Base widths are 9, 15 (reconstructed), and 12 mm. All 3 are 2 mm. thick.

The Pita site produced 2 bases of similar small, triangular end blades. One of these has exceedingly delicate retouch and minute edge serration (Pl. 2, 25). The original lengths probably were close to 2 cm. Base widths are 1 and 1.3 cm. Thicknesses are 1.5 and 2 mm.

End blades, biface, contracting stem, chert (2): A single specimen of this type from the Meeus site has extremely delicate retouch and serrations. The stem edges are very faintly worn or ground and are not serrated. Although this specimen is 2.9 cm. long and 1.1 cm. wide, it is only 1.5 mm. thick (Pl. 2, 4).

The Mungiok site has a similar end blade. It is not quite as carefully worked and has more pronounced serration. Further, the stem is marked off from the forward margins by a slight shoulder asymmetrically set on each side. This specimen is 2.8 cm. long, 1 cm. wide, and 2 mm. thick (Pl. 2, 30).

Both specimens have very thin lenticular cross-sections and slightly concavo-convex longitudinal sections.

End blade, biface, long-stemmed chert (1): This Meeus site specimen seems to have been a large, stemmed end blade that was reworked to serve as a stemmed end scraper. The slightly asymmetric stem has one straight and one slightly convex edge. These converge slightly to a rounded base. The stem, measuring from the well-defined shoulders, is 3 cm. long. From the shoulders, the margins run forward, slightly converging to a steeply retouched, slightly convex, abrupt nose. The over-all length is 4.9 cm.; the maximum width, at the shoulders, is 1.8 cm.; the maximum thickness at the scraper edge is 5 mm. (Pl. 2, 7). A rather similar specimen occurred in the Sarqaq culture (Mathiasen, 1958, Fig. 6, 9).

End blade, biface, straight stem, chert (1): This single Mungiok site specimen is very carefully worked despite a relatively thick lenticular cross-section. The convex forward edges have minute serration. The specimen is a little asymmetric. The stem on one margin is marked by a faint shoulder, and on the other edge by what might have been a more pronounced shoulder if not a small side notch. The base of the stem has been broken off. The specimen is 1 cm. wide and 4 mm. thick (Pl. 2, 31).

Blade fragments, biface, chert (27): The Meeus sample includes 22 of these fragments. Five are tip fragments; 6 are base fragments; 4 are edge fragments; the remaining 7 cannot be further identified. Four of the tip fragments have symmetrical, convex sides, and of these, one is serrated. The fifth tip fragment is thin with asymmetric convex sides suggesting a side blade more than an end blade. Two of the 6 base fragments suggest the thin straight-based triangular end blades. One rather thick fragment is probably the base of a burin. Another, nicely worked, is either a side blade fragment or the slightly contracting stem of a rather large blade for it measures 3.1 cm. by 1.2 cm. by 3 mm.

The 3 Pita site pieces in this category are a rather thick edge fragment, a small nondescript fragment, and a mid-section fragment from a poorly worked biface, 2 cm. wide.

The Mungiok site sample contributed 2 fragments to this category: a flake with biface retouch on a convex edge, and a mid-section fragment from a coarse biface with a width of 2 cm. and a thickness of 5 mm.

Side blade, biface, chert (2): Two, thin, broken specimens from the Meeus site belong in this category. One is 2 mm. thick with an original length over 2.5 cm. and a width of more than 1.3 cm. It has one straight and one quite convex margin. The second example, lacking one end, is 2.2 cm. long, 8 mm. wide, and 2 mm. thick. It has straight, slightly converging sides and a convex end. Possibly it was meant to approximate the sub-rectangular side blade form (Pl. 2, 5, 6).

Blade fragments, biface, asymmetric, chert (3): Three end fragments from the Meeus site have one straight edge, one convex edge, and a rounded end. One has very carefully controlled retouch. It is 4 mm. thick and very likely is part of a side blade, or, less likely an asymmetric end blade. The second example is larger and more crude, lacking the careful retouch. It has had a little pressure retouch. Likely it is an unfinished analogue of the preceding specimen. It is 6 mm. thick. The third is larger still and more crude. It has been formed by percussion flaking and pressure retouch had just been started on the convex edge. It is 7 mm. thick. These three suggest expected stages in the shaping of an artifact. (Pl. 2, 18, 19).

End scraper fragments, chert (2): The Mungiok site produced 2 unifacially retouched fragments that show a rather flat bulbar surface and a steeply retouched edge. One edge is gently convex; the other is slightly concave. These small fragments have thicknesses of 5 and 8 mm. (Pl. 2, 32, 33).

Unifacially retouched flakes, chert (13): The Meeus site contributed 7, the Pita site 2, and the Mungiok site 4, of these specimens. These are generally

thin, random flakes of various shapes and sizes showing intentional retouch on one or two of their edges. The retouch varies in quality and quantity from specimen to specimen. On one from the Meeus site, the retouch has been well-controlled to produce pronounced serrations.

Flake perforator, chert (1): A large flake from the Pita site has been retouched along the opposite surfaces of two edges that converge to a strong, slightly obtuse point. The retouch is unifacial except immediately at the point, where it is bifacial. This artifact could have served well as a hand-held perforator or graver. It is 3.6 cm. long, 3 cm. wide, and 9 mm. thick (Pl. 2, 26).

Retouched blades, chert (4): Three of these artifacts came from the Meeus site while the other was found on the Pita site. In this collection a blade is distinguished from a microblade by its having a maximum width exceeding 1 cm. The 4 here have widths of 11, 13, 14, and 15 mm. All are incomplete and have triangular or quadrangular cross-sections. Retouch is restricted to the margin of the upper surface. One of the Meeus site examples has pronounced, irregular serration on both sides. (Pl. 2, 9, 10).

Microblades, chert (25): Nineteen of these specimens are from the Meeus site, 2 are from the Pita site, and 4 are from the Mungiok site. Cross-sections are thin, triangular or quadrilateral. Although every specimen in this category is broken, longitudinal sections tend to be slightly concavo-convex. Width ranges from 5 to 10 mm. and averages 7.6 mm. Thickness, ignoring the bulb of percussion, ranges from 1 to 4 mm., averaging 2 mm. Three from the Meeus site and 1 from the Mungiok site show minute use scars along one or both of their margins. One Mungiok site microblade has retouch on one edge of its bulbar surface (Pl. 2, 35). A fourth Meeus site microblade has been pressure-flaked carefully along one edge and shows use scars on the other edge (Pl. 2, 12). One of the Pita site microblades has slight use scarring along one edge, while its opposite margin shows slight use scarring on the upper surface and delicate pressure flaking on the bulbar surface. This tool also has a faint suggestion of side-notching at the bulbar end as if for hafting (Pl. 2, 28).

Flakes, used, chert (33): This category consists of 24 flakes from the Meeus site, 6 from the Pita site, and 3 from the Mungiok site. These are all random flakes showing various amounts of use scarring along one or more edges. The used edge may be straight, or convex, or concave.

Cores, chert (3): Three, thick, asymmetric fragments from the Meeus site likely are cores. They are all rather small fragments of larger objects so that their precise core types cannot be determined. None argue strongly for membership in a polyhedral core category (Pl. 2, 8).

Artifacts of quartz (8): Unless otherwise noted these specimens are of quartz crystal. Five fragments (2 of amorphous quartz) were found on the Meeus site. Two came from the Mungiok site. The eighth was found on the surface about 100 yards east of the Pita site. This specimen is a fragment of a carefully worked, rather large end blade. It might have derived from a later occupation in the Ivugivik area. The Mungiok site specimens are a small, bifacially retouched fragment (Pl. 2, 37), and a thick piece of a snub-nosed end

scraper. The Meeus site specimens are a small used flake, a thick used fragment, a small edge fragment of a biface, a biface fragment, perhaps of a contracting stem end blade (Pl. 2, 21) (amorphous quartz), and a thick, broken, bifacially retouched flake (amorphous quartz) that probably served as a knife (Pl. 2, 20). Quartz occurs commonly in the Ivugivik area and about one mile from these sites there is a prehistoric quartz quarry of undetermined cultural affiliation. It stands some 230 feet above sea level. Further, a small pocket of amorphous quartz reject material, associated with a quartz outcrop, occurred within the limits of the Meeus site; however, it has also not been possible to determine the age of that very small quarry. Since quartz artifacts are common in the area's known Dorset sites and since none of the objects in this category are culturally diagnostic, it is not certain that these objects are pre-Dorset.

Other materials (5): Excepting a slightly worked bone fragment and several small samples of lithic reject material, there is little else, and none of it very informative. There is the previously noted chert burin-like tool of Dorset culture from the Meeus site (Pl. 2, 22). It can safely be ignored. Also from the Meeus site is a slate flake that has been ground over almost all of its upper surface (Pl. 2, 23). A third Meeus site specimen is a piece of fine-grained sandstone showing retouch over most of its surface except one end which has been ground on four sides to form a point (Pl. 2, 24). The Pita site produced a flake of grey slate and one of red slate. The latter has been retouched along two converging sides to form a sharp point. Perhaps it served as a delicate flake perforator or etching tool (Pl. 2, 29).

Discussion and conclusions

The site elevations, as noted earlier, indicate that the sites had a pre-Dorset occupation. The artifacts provide certain evidence of this. The high proportion of burins and burin spalls, the small, contracting stem end blades, the long-stemmed end blades, the technique of delicate serration on triangular, straight-based, and stemmed end blades all support this conclusion. Similar end blades and similarly high burin and burin spall frequencies seem to characterize the three pre-Dorset samples described to date, Thyazzi (Giddings, 1956), Independence I (Knuth, 1958), and the Sarqaa culture (Larsen and Meldgaard, 1958; Mathiassen, 1958). Preliminary reports on the pre-Dorset of the Igloodik area (Meldgaard, 1960a,b) suggest a somewhat similar trait complex. Related materials have been discovered in the Pelly Bay area and are the subject of continuing investigations (Rousselière, n.d.). Most of the other traits in the Ivugivik sample are non-diagnostic. The 3 slate flakes and the sandstone object might well belong to a later Dorset culture occupation of the area and, like the burin-like tool, are better barred from further discussion. With these exceptions, the first conclusion is that the Meeus, Pita, and Mungiok assemblages are typologically, and as argued earlier, chronologically, pre-Dorset. On scant evidence the assumption is made that the three sites were roughly contemporaneous. The three sites and their samples are included under the term "the Ivugivik complex".

The Ivugivik complex sample is small so that comparisons with other pre-Dorset samples are tentative. Contrasted with the two fully reported pre-Dorset assemblages of the eastern Arctic, Thyazzi and Sarqaa, end scraper

remains are very rare. The expanded corner and triangular end scraper forms were not found. The concave side scraper, frequent in Sarqaq culture, is also unreported here. Frequencies of burins, burin spalls, and microblades are a little more dependable aspect of comparison. The burin and burin spall frequencies, 23.9 per cent and 13.4 per cent, compare favorably with other pre-Dorset assemblages. The blade-microblade frequency, however, is 13.3 per cent, and this is a marked contrast. No microblades were reported from Thyazzi (Giddings, 1956), and they were rare in Sarqaq culture (Mathiassen, 1958). I am skeptical of the absence of microblades in the Thyazzi site and I would expect a much larger sample from that site to show their presence in a low frequency. Perhaps the specimen cautiously identified by Giddings as a "wide burin spall?" (1956, p. 262) is a microblade.

A second, rather easily reached, and fully expected conclusion, is that the people of the Ivugivik complex had a technique for, and some success in, hunting sea mammals. The only identified bones, and all were excavated, were one walrus bone and twenty-one seal bones.

The placing of the Ivugivik complex in the pre-Dorset culture of the eastern Arctic implies its membership in the Arctic Small-Tool tradition¹ (Irving, 1957; MacNeish, 1959b). Its burin and blade-microblade industry and its triangular and stemmed end blades indicate something of the pre-Dorset culture ancestry of Dorset culture. The difficulty with the Ivugivik complex is its position within the pre-Dorset continuum. It shows marked similarity to Sarqaq culture but also conspicuous contrasts. For example, there is a marked contrast between the two in end scraper and microblade frequencies. Many forms such as transverse blades and concave side scrapers occur at Sarqaq but not Ivugivik. Perhaps this is not entirely due to sample size. More dependably, while they both have a profusion of burins, these show many differing attributes in the two samples. Some 98 per cent of the Sarqaq burins are ground, while only 2 per cent (1 specimen) of the Ivugivik burins are ground. Larsen and Meldgaard report only 1 uniface burin from a sample of 197 (1958, p. 50) while 14 of 46 (including the microblade burin) Ivugivik burins are uniface. The contrast here is roughly 0.5 per cent to 30 per cent. Multiburins seem to be 4.6 per cent of the Sarqaq sample but are 15.6 per cent of the Ivugivik complex specimens. No illustrated Sarqaq burins show the lateral flare of several of the Ivugivik specimens. The Ivugivik burins seem to be generally more variable in form. The technique of grinding the surfaces of end blades was common in the Sarqaq culture but absent on the few end blades described here.

These typological differences between Sarqaq culture and the Ivugivik complex are explainable in terms of time and space. The following comments support the view that the Ivugivik complex is different because it is older than Sarqaq. Sarqaq culture, dependably dated at 700 to 900 B.C. (Mathiassen, 1958), is clearly a very late member of the pre-Dorset continuum. Conversely,

¹Through the courtesy of J. L. Giddings Jr., I was able to examine the Denbigh Flint complex material in the Haffenreffer Museum, Brown University, Providence, R.I. As one would expect the Ivugivik and Denbigh Flint complexes have much in common. Despite the considerable time and space gaps between the two, I received an impression of near-identity in their burin forms. This example of the persisting conservatism of the burin industry in arctic prehistory is an eloquent reflection of cohesion within the Arctic Small-Tool tradition.

Independence I culture of northern Greenland seems to be very early pre-Dorset with a C-14 date of 3840 ± 170 B.P. (Knuth, 1958). By very painstaking field work, Knuth gathered an important artifact sample. While not yet described, the burins illustrated (1958, Fig. 4, p. 571) do not appear to have ground surfaces. Similar but more substantial support for an early pre-Dorset dating of the Ivugivik complex comes from the pre-Dorset sequence of the Igloolik area. The earliest pre-Dorset there reaches 2000 B.C. (Rainey and Ralph, 1959). Meldgaard (1960b) has reported that the sequence of pre-Dorset at Igloolik extends from 2000 to 800 B.C. He has generously informed me (personal communication) that a large proportion of his late pre-Dorset burins are ground on the sides. Since the very late pre-Dorset Sarqaq has 98 per cent ground burins, since the late pre-Dorset at Igloolik has a large proportion of ground burins, and since the very early pre-Dorset Independence I seems to lack, or nearly lack, ground burins, the Ivugivik complex, with only 2 per cent of its burins ground, is very likely older than the later pre-Dorset stages and perhaps a little younger than Independence I.

A more slender reason for construing the Ivugivik sample significantly earlier than late pre-Dorset lies in the elevation of six early Dorset sites in the same region (three on Sugluk Island, one at Ivugivik, and two on Mansel Island). All begin below 65 feet above sea level although one extends from 60 to 86 feet above sea level. These elevations suggest that late pre-Dorset sites in the same region should be slightly higher, say between 70 and 90 feet above sea level. Therefore, the minimum elevation of Ivugivik complex material of 105 feet above sea level, suggests an occupation in early or middle pre-Dorset time. That would be between 2000 and 1000 B.C. Therefore, the third conclusion of this paper is that the Ivugivik complex dates in the second millennium B.C., perhaps near the middle of that millennium.

The only eastern Arctic pre-Dorset sample, excepting Sarqaq, that has been fully described is that from the Thyazzi site in extreme northeastern Manitoba (Giddings, 1956). Unfortunately it has not been dated. Although a small sample, it has strong typological affinity to the Ivugivik complex. Giddings's excellent illustrations show side blades (Fig. 78, 5-6; Fig. 80, 25), end blades (Fig. 78, 1-3), blade fragment (Fig. 78, 10), burin spalls (Fig. 80, 16-20), burins (Fig. 80, 1-10), and a perforator (Fig. 80, 27) quite like those from Ivugivik. The burins are especially close for none from the Thyazzi are ground; unifaciality is a frequent attribute; the outlines are generally like the Ivugivik outlines; and one shows the lateral flare attribute of some Ivugivik examples. As noted earlier the two samples contrast sharply because of the absence or rarity of microblades at Thyazzi. This beguiling contrast likely has an obvious explanation that eludes me.

A final member of the Arctic Small-Tool tradition germane to this discussion is the Dismal 2 Microlithic from near the Coppermine River in the central Canadian Arctic (Harp, 1958). As Harp has discussed it, this sample links the western and eastern members of the Arctic Small-Tool tradition. As such it is a welcome, if silent spokesman for the western origin of the pre-Dorset culture including the Ivugivik complex. With some 120 specimens it conveniently shows something of the western Arctic heritage of the Ivugivik material. The two areas share unground angle burins, worked and unworked burin spalls, unmodified, used, and retouched microblades, contracting stem biface end

blades, delicate retouch and serration on end blades, asymmetric biface side blades, and a trace occurrence of quartz crystal artifacts. The Dismal 2 Microlithic sample differs from the Ivugivik complex in several respects, notably its lower frequency of burins and burin spalls (each about 6.6 per cent), higher microblade frequency, and better end scraper representation. Nevertheless, of the described assemblages, the Ivugivik complex seems closer to the Dismal 2 Microlithic and Thyazzi than to the Sarqaq culture.

Presumably the pre-Dorset occupation of Ungava resulted from a movement across the western end of Hudson Strait via Mill, Salisbury, and Nottingham islands from southern Baffin Island. The National Museum of Canada recently received a small, mixed, archaeological collection¹ from near Lake Harbour. It indicates a pre-Dorset occupation on the south coast of Baffin Island (Taylor, 1960). The sample includes, in addition to typical stone tools of Dorset culture, ground and unground chert burins, a burin blank, burin spalls, a small contracting stem end blade, and a small triangular end blade with slight surface grinding.

¹During the 1960 field season, while working for the National Museum of Canada, Dr. M. S. Maxwell, Michigan State University, relocated, on Juet Island, the site that produced this collection. A preliminary report on that work is in press with the National Museum of Canada and further work was carried out on the site in 1962.

ON THE FORMATIVE PERIOD OF THE DORSET CULTURE

Jörgen Meldgaard

The new evidence to be presented in this paper is essentially restricted to the Igloolik area, Northwest Territories, where excavations were carried out in 1954 and in 1957.¹ Further, within the 4,000-year culture sequence in this area, I will concentrate on the centuries around 800 B.C.

Igloolik is truly an arctic area, one in which it has not been possible for man to combine an arctic summer life with a winter life in the forest, or vice versa. The economy has been based on the resources of the sea, and, to a lesser degree, on the mammals of the land, and the fishes in the rivers. Archaeology, as well as our knowledge of the present Eskimos, confirms this for all periods.

When working in the Igloolik area the archaeologist cannot help developing into an evolutionist. Throughout the 1,200 years of the pre-Dorset, or Sarqaq, and through the following 2,000 years of the Dorset people the course of evolution appears so logical and consistent that given only a few introductory steps in a typological series it seems possible to foretell, except when climate or neighbors interfere, the subsequent form and perhaps even the end-product.

In our material there are two 'breaks' evidently caused by migration or diffusion. The last break has been long known: the Thule culture intruding from the west about A.D. 1100-1200. However, since this was obviously an occurrence limited to the treeless zone, it is of minor interest to this symposium. The other break probably is more relevant: the emergence of the Dorset culture about 800 B.C.²

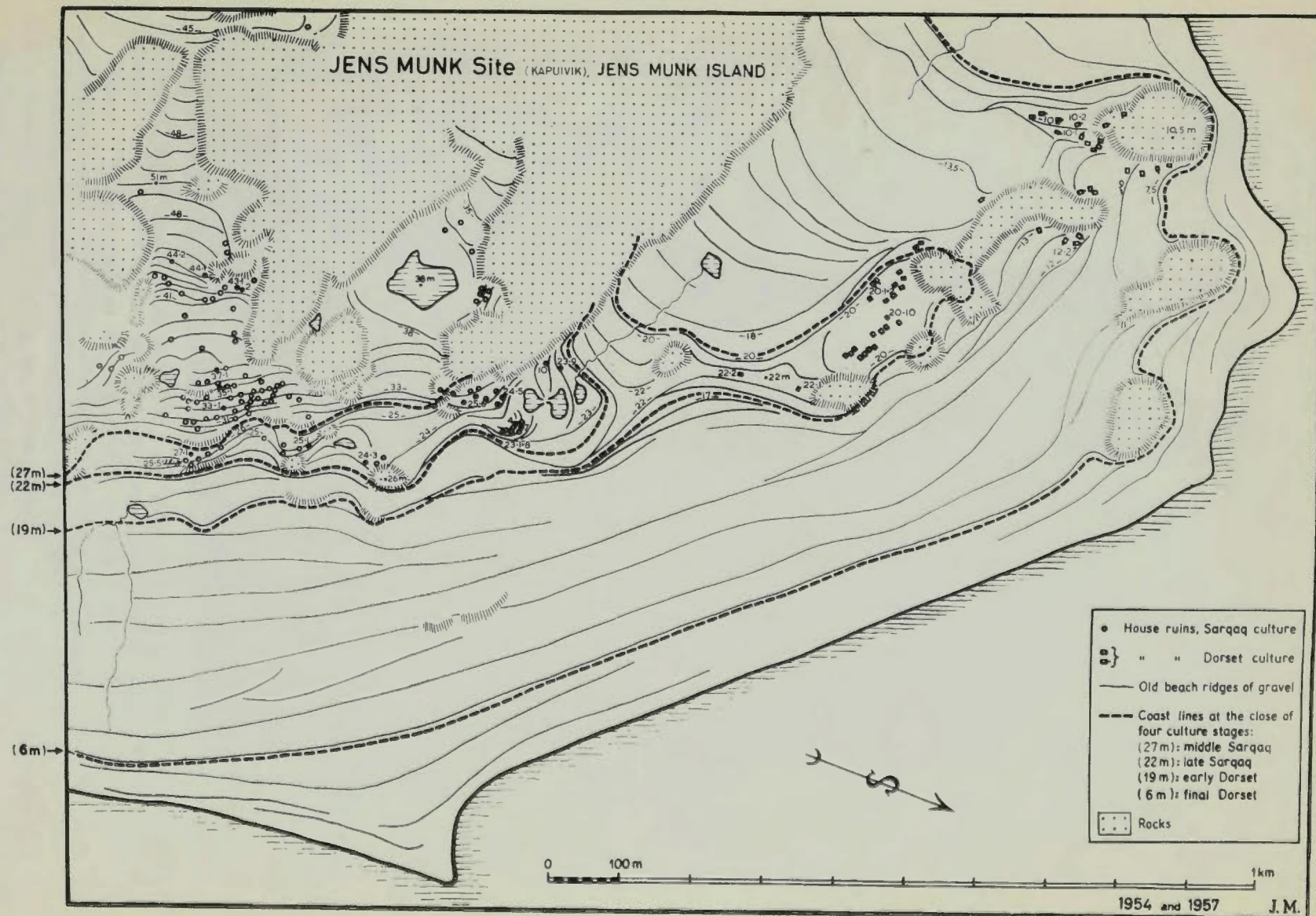
During the investigations in the Igloolik area a very large number of Sarqaq and Dorset sites were located, but excavations were concentrated on three key sites, where conditions were most favorable, that is, where the elevated beach ridges, the basis for the chronological system, were best developed. Here there were between 60 and 150 of these ridges in an area where there is only a very slight and gradual rise in the profile of the land and no obvious erosional features.

The sites and the artifacts

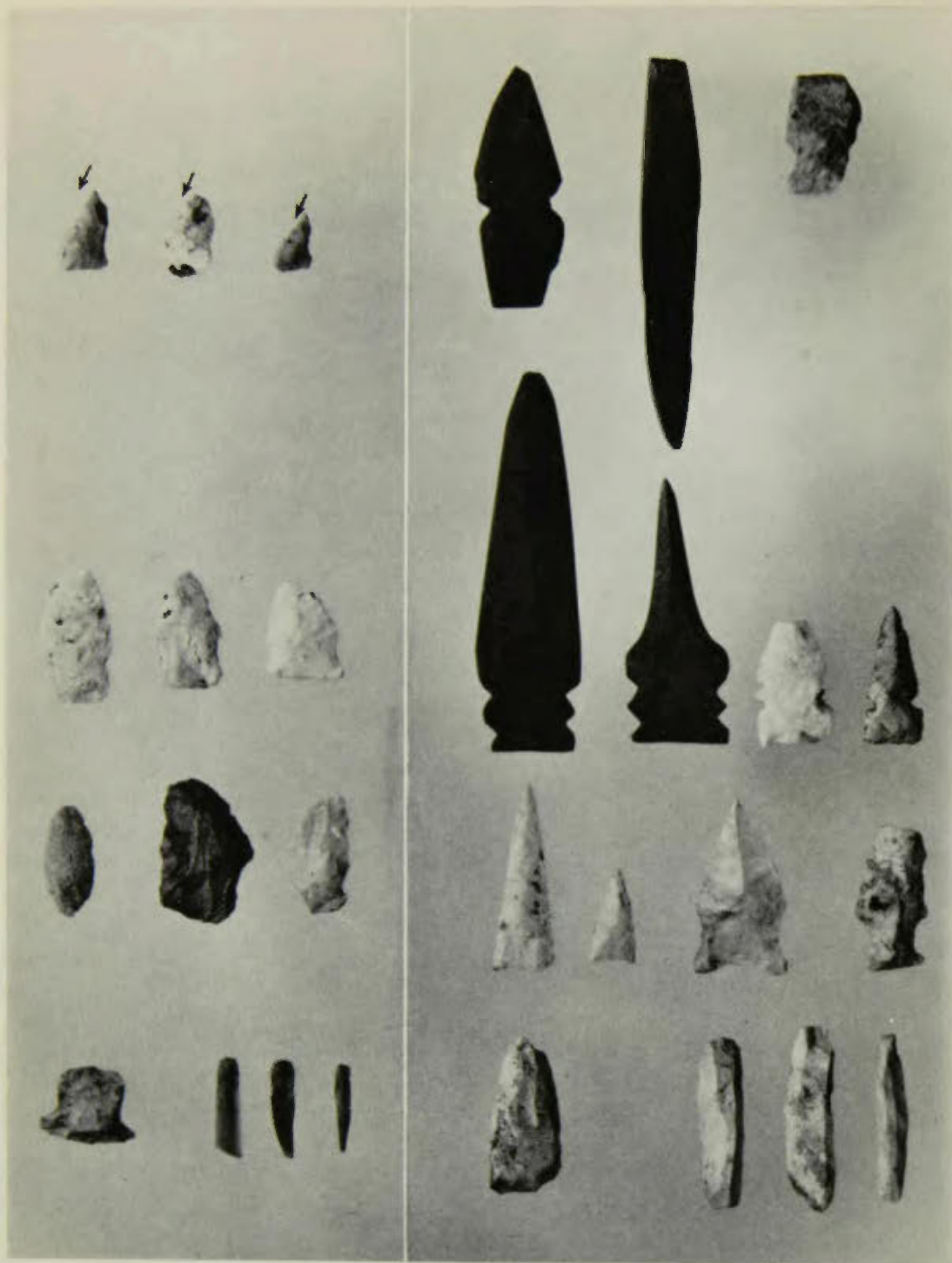
Alarnerk is my type-site for Dorset. Two hundred and eight houses and 18 graves are here scattered between the 23-meter level and the 8-meter level; on the basis of the height above sea level, the house types, and the artifact types,

¹For preliminary reports see Meldgaard, 1955b, 1956, 1960a,b.

²This date is estimated on the basis of the available C-14 dates—Igloolik, Dorset I: 952 B.C. (ivory sample); Pearyland, Independence II: 870 B.C. (wood sample); Southampton Island, the T1 site, earliest date: 675 B.C. (burned bone sample).



Pl. 1. Map of the Jens Munk site, Jens Munk Island. The late Sarqaq material is described from the 23-meter level (houses 23-1 to 10). The early Dorset material is from the 22-meter level (houses 22-1, 2).



Pl. 2. Stone material from latest Sarqaq (left) and from early Dorset (right), excavated at the Jens Munk site, 23-meter and 22-meter levels.

the material has been divided into five zones or periods. Houses of the later Thule culture appear on the same levels as Dorset V, but they are situated half a mile to the west. They contain intruding Dorset artifacts of the same late period.

Parry Hill site (= Kaleruserk), on Igloolik Island, contains rich habitation debris on beach ridges between the 54- and the 42-meter level with numerous house ruins and extensive middens, all representing early Sarqaq, a more scattered habitation during the later stages of Sarqaq, and finally a few houses from early Dorset.

Jens Munk site (= Kapuivik), the third main site, is situated on Jens Munk Island. This site seems to have been a settlement of importance throughout Sarqaq, Dorset, and Thule times to the present day; only early Sarqaq is poorly represented. The sequence at the Jens Munk site is therefore chosen for discussion (Pls. 1 to 3).

Our 'critical period' at the Jens Munk site (as also at the two other sites mentioned above) is at the 22-meter and 23-meter levels. In the rounded, oval houses with central fireplace, at 23 meters, we find the last traces of Sarqaq, and in the large, rectangular, dug-down houses with side benches at 22 meters the Dorset materials emerge. A selection of distinctive artifact types from these two levels is shown in Pls. 2 and 3. In both plates Sarqaq is to the left and Dorset to the right.

The Sarqaq burins are of flint, very small (average much smaller than those of the earlier levels), and some are ground on the sides. The corresponding type in Dorset is the burin-like implement with ground facet and ground sides. The majority are made from slate, some from flint. A specific type in slate has the facet as a short, slanting edge at the "top".

In Sarqaq a variety of tanged points and blades of flint are found, a few of them with faintly marked side-notches. In Dorset there are blades with sharp-cut side notches; when made in slate, usually with double notches of triangular form, and, in flint, with square-cut notches. The pointed, oval arrowpoint in Sarqaq has no counterpart in Dorset, where we meet with the narrow, triangular harpoon blade, which is often 'fluted' from the pointed end. Microblades in late Sarqaq are small and curved, made from dark flint, in Dorset they are larger, straight, and made from light-colored flint.

The bone material includes the lance, only slightly altered from Sarqaq to Dorset, and three main types of harpoon heads, open-socketed in Sarqaq and with partly closed sockets in Dorset. The Dorset types, however, could have been derived from their Sarqaq counterparts. In Sarqaq there are arrowheads (not reproduced) with scarf bases, one type with blunt point and one type with a bed for an oval flint blade. In Dorset there is no sign of arrows. The flint flaker points in late Sarqaq are all made from seal penis bones and roughly executed, in Dorset walrus penis bones were used, the form angular and carefully finished. In Sarqaq the sewing needle is small, with circular cross-section, round or oval hole, and blunt head. The early Dorset needle is long, with flat cross-section, pointed, oval hole, and with pointed head.

Finally, some new, important elements in Dorset are shown in Pl. 3: the multibarbed fish-spear, an awl of caribou jawbone, and an ulu-like knife of caribou shoulder blade. The wide, thin sledge-shoe made from bone, and the snow knife also enter the scene with Dorset.

The elements mentioned above, supplemented with a few more of special importance, are shown diagrammatically in Pl. 5 and the later developments during the Dorset periods are also indicated. This scheme is preliminary, and it is also simplified. For example, beginning from the left, the flint point with sharp angular side notches starting with early Dorset was preceded in Sarqaq by a side-notched asymmetrical knife blade, and a somewhat similar blade appears in later Dorset stages. There are no transition forms, however. Likewise, a triangular flint point was known in Sarqaq, although this fact is not shown in the scheme; but it is limited to the earlier stages and it is smaller than the harpoon blade introduced with Dorset. Obviously it was used as an arrow-point.

Summarizing this preliminary scheme, it is seen that: 1) An essential part of the elements in early Dorset are new, with no counterparts in Sarqaq. Another part consists of new forms, which apparently cannot be derived from their counterparts in Sarqaq. 2) The majority of these elements enter the scene in a form unfitted to meet the demands of the surroundings. Consequently they are either abandoned or changed into more suitable forms; an adaptation, or acclimatization, takes place. 3) At the same time (or slightly earlier) the majority of the Sarqaq elements disappear after having existed for more than 1,000 years in the area. 4) However, important elements like the harpoon, the lance, and the burin persist into the new era, although they are undergoing marked changes.

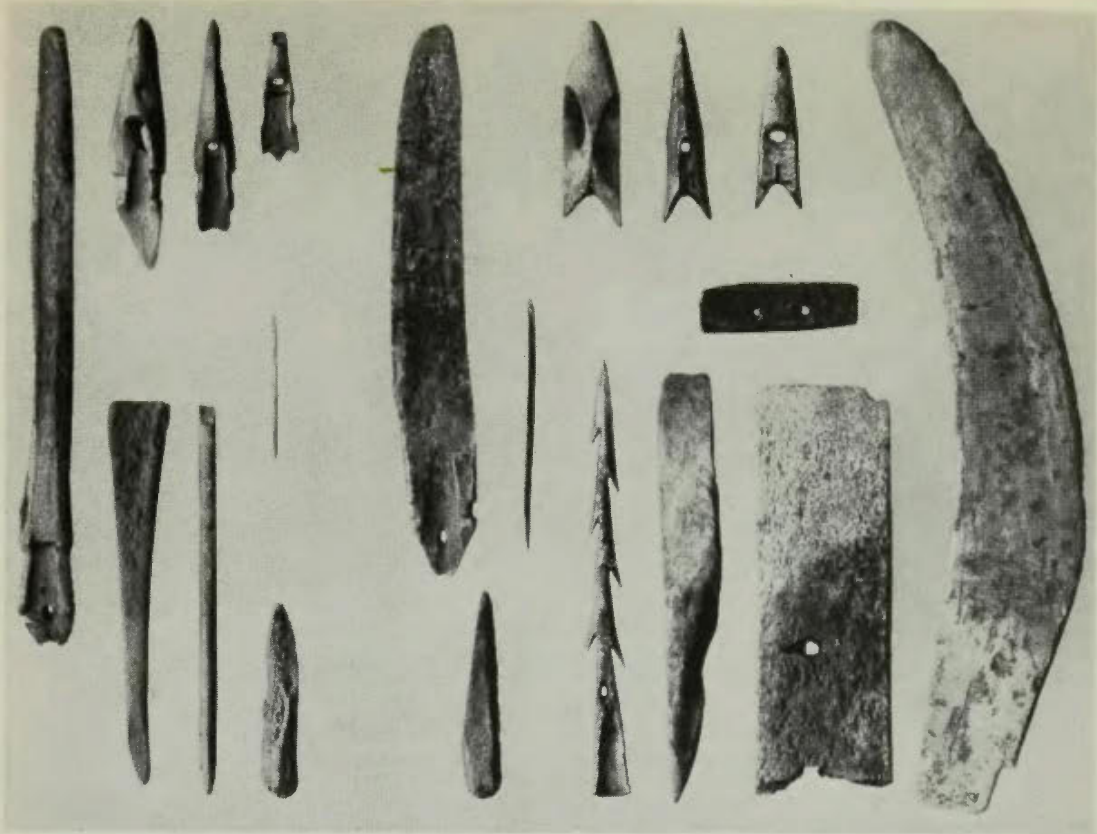
Discussion

What is the conclusion of these four points: new people or diffusion in the Igloolik area? At present I am inclined to believe that the Sarqaq people did not die out, although they disappeared around Igloolik—as they did in west Greenland at about the same time (Larsen and Meldgaard, 1958). But most probably new people turned up with new customs somewhere in the borderland of the Canadian Sarqaq area, the result being the growth of a new form of Eskimo culture and a rapid spread across the eastern Arctic.

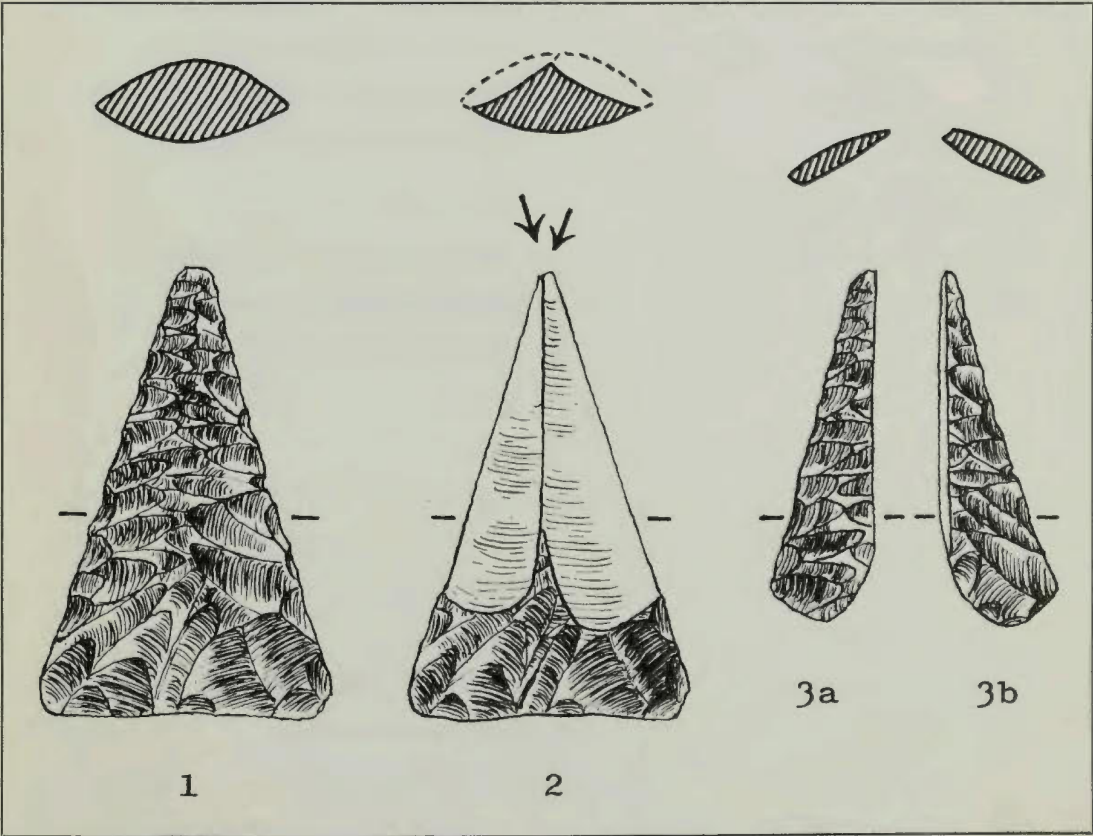
This brings us to the second and last question: From where did this diffusion or migration take place, where was the zone of contact and expansion? I think it should be possible to point to a specific area, since the contemporary emergence of new forms and traits *a priori* tend to eliminate any theory of a slow diffusion from various directions and sources.

I suggest that the arctic coast, from King William Island to Alaska, can be disregarded. Neither do we know of any possible source in northern Alaska. MacNeish is not likely to have overlooked all Dorset-like traces during his surveys at the coasts around the mouth of the Mackenzie, and, especially, along the lower Firth River, including the famous Engigstciak site. In the Engigstciak sequence (1956), the New Mountain horizon and the Firth River horizon show many points of similarities to the earlier Sarqaq levels at Igloolik, and the Buckland Hills and Joe Creek horizons appear to be close to the latest Sarqaq. But neither at this stage, nor at the following Cliff phase, to which there is no counterpart in the eastern Arctic, do we find any indications of a transformation into Dorset-like material.

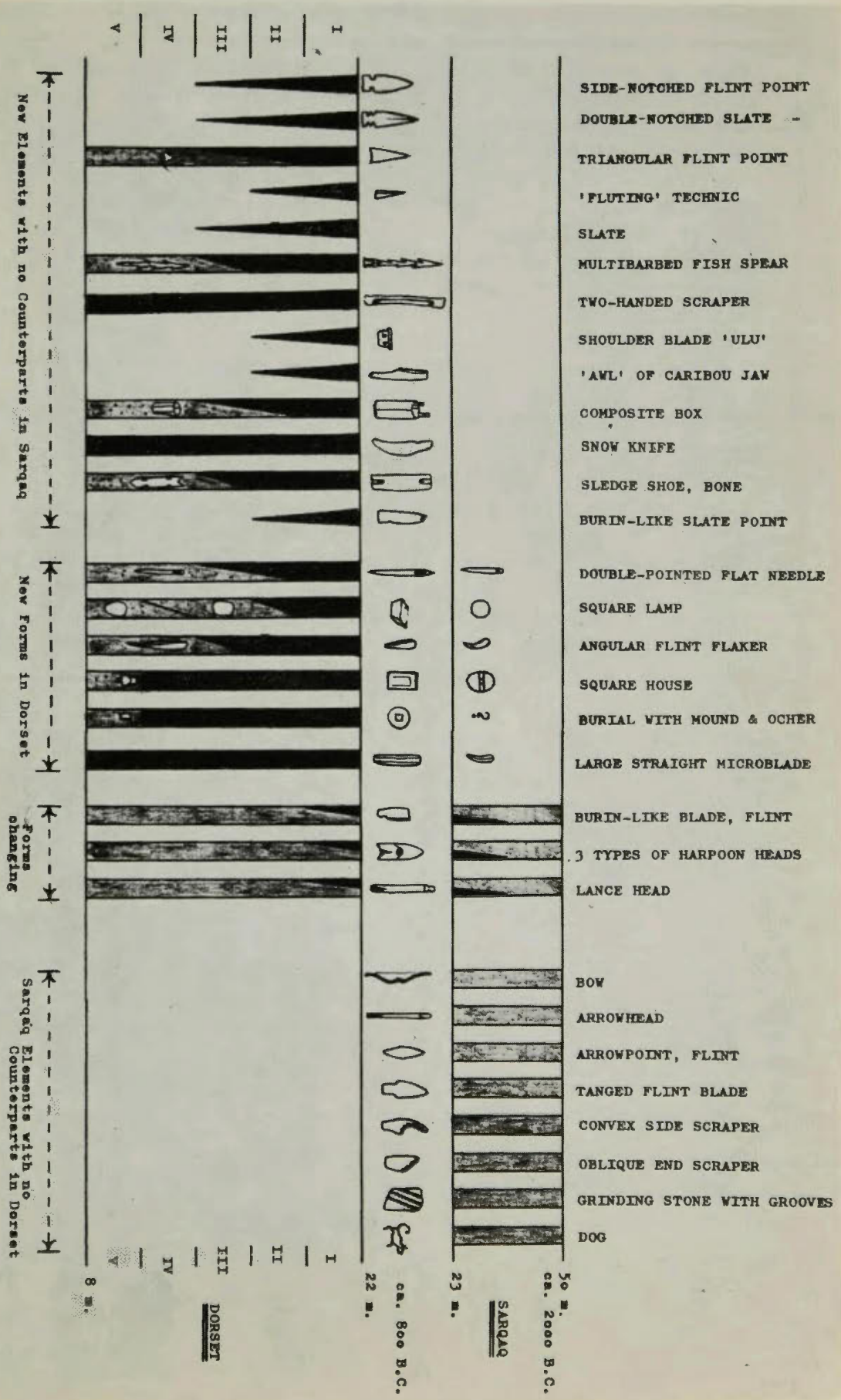
Harp's surveys on the Barren Grounds west of Hudson Bay (Harp, 1959b) have revealed no Dorset material in that area either, nor has MacNeish's recon-



Pl. 3. Bone material from latest Sarqaq (left) and from early Dorset (right), excavated at the Jens Munk site, 23-meter and 22-meter levels.



Pl. 4. The 'fluted point' in early Dorset. Stage 1, both sides chipped. Stage 2: one side with scars after two blades have been pressed off from the pointed end. 3a is the triangular 'sharpening blade No. 1'; 3b, the 'sharpening blade No. 2'.



Pl. 5. Preliminary sketch of elements in early Dorset (and in late Sarqag) based on the Jens Munk site. The development through the Igloodik Dorset periods from about 800 B.C. to about A.D. 1300 is indicated.

naissance farther inland in the Northwest Territories brought to light any form of proto-Dorset or Dorset (MacNeish, 1951).

If we survey the extension of sites known from the early Dorset, as represented at Igloolik in periods I and II, it will appear that an early stage Dorset was spread over a very large area in the east, and judging from the number of sites and their contents we should probably visualize a relatively large population, as compared, for example, with late Sarqaq.

In Pearyland, Knuth's (1958) Independence II seems to be an early Dorset stage. In west Greenland the scores of Dorset sites found are all of early Dorset form, though showing a local stamp and being in time somewhat later than in Pearyland (Larsen and Meldgaard, 1958; Mathiassen, 1958). In northern Baffin Island, at Pond Inlet, we have traces of early Dorset in Therkel Mathiassen's collections, including typical harpoon heads (Mathiassen, 1927). Around Igloolik we know of seven extensive sites. Moving south to the Hudson Bay area Collins's large site fits into the same category (Collins, 1956a), and so do Taylor's Toonoo site on Sugluk Island and the Sima site on Mansel Island (Taylor, described at New Haven Symposium, 1960). A few scattered artifacts in flint and slate of early Dorset forms have been found on the Labrador coast despite the lack of systematic search for pre-Thule cultures on these stretches, and finally, Newfoundland, farthest to the south, has a rich representation of early Dorset material (Wintemberg, 1939; 1940; Harp, 1951).

In a paper read at the 5th International Conference of Anthropological and Ethnological Sciences in 1956 (1960a) I pointed out a very special trait in early Dorset: the "fluting" of flint blades, mainly of the narrow triangular blade type (Pl. 4). After careful chipping on both sides two long blades were pressed off from the pointed end on the same side, each removing approximately one-half of the chipped surface, and resulting in a keeled appearance of this side of the blade. The process is parallel to the fluting of the Folsom blades, but the purpose was primarily to obtain sharp edges, secondarily to make the blade thinner. The proportional frequency of this trait decreases in the early Dorset horizon as one goes north from Newfoundland, where I have found that more than half of the triangular end blades are of this fluted variant, with the pressed-off, triangular sharpening blades (or channel flakes) of equal frequency (i.e., twice the number of the triangular blades). Passing Southampton Island, with its T1 site, to Igloolik the trait further declines in importance, and it never reached Greenland (for a more detailed description and discussion, see Meldgaard, 1960a).

This seems to me to be fairly good evidence for a south to north spread in early Dorset. At the same time it points to the Labrador Peninsula, including Newfoundland, as the area where the complex which we know as Dorset may have been formed, and to the probable gateway through which our homeless "new elements" were flowing.

Finally, as I have phrased it before, several of these new traits in early Dorset smell of forest: of woodcarving, of caribou, fish, and bear-cult, and of loose snow. Despite the sad fact that these traits are rather perishable, especially to the archaeologist working in the damp forest belt where organic material so rarely is found—despite this and considering, as the alternative, the flints and the slate or slate forms, the house, and the burial, cannot we then point to a possible source about 1000 B.C. somewhere in the triangle between the Great Lakes, James Bay, and Newfoundland?

NORTHEASTERN CROSSTIES WITH THE ARCTIC¹

William A. Ritchie

As far back, at least, as 1881 there were attempts to account for the presence of the ground slate semilunar knife in the northeast by supposing Eskimo connections (Abbott, 1881, pp. 63-4). Many and diverse views have since been ventured, ranging from limited Eskimo-Indian exchanges (Jenness, 1933, pp. 394-5) to actual migrations of Eskimo groups into the region south of the upper St. Lawrence valley (Beauchamp, 1897, pp. 64-5, 69). Small-scale Dorset-Beothuk relations were envisioned by Jenness soon after his sagacious deduction of an early Eskimo Cape Dorset culture in the eastern Arctic and these have since been generally maintained (Jenness, 1929, pp. 37-8; Harp, 1951, p. 219; for a more skeptical version see Harp, 1953, pp. 45, 47-9).

Cultural connections on a much broader scale were postulated by de Laguna, whose detailed studies of 1946 and 1947 include some ten artifact types or traits which she suggests may have found their way into Indian hands through Eskimo, chiefly Dorset, contacts. Of principal significance are the ulu and double-edged ground slate knives and points; fixed and detachable barbed bone points; sundry forms of the chipped stone end and side scraper, knife, and projectile point; and the single piece bone comb. In return, Indian to Eskimo donations were regarded as limited to the bone snowshoe needle, cylindrical bone tool for indirect percussion flaking, and possibly the plummet and stone gouge.

In de Laguna's comprehensive survey the Indian cultures concerned in this exchange were the Laurentian, Red Paint, and Tadoussac complexes, all representing middle to late Archaic manifestations in the northeast.

Many of the traits mentioned, plus the non-Eskimoan category of heavy, ground stone, wood-working tools, comprising the adze, celt, chisel, and gouge, have, as Spaulding (1946) and others have stressed, a wide distribution within the circumpolar coniferous forest belt, albeit with serious space and time gaps. Moreover, with minor deviations, this list of boreal zone traits serves to set apart the contemporaneous Archaic cultures of the northeastern and southeastern areas of North America, a marked dichotomy, which seems indicative, not alone of ecological differences, but of important distinctions in the historical backgrounds of the two regions.

The ulu, and other types of rubbed slate knives and points, barbed bone points and leisters, and pecked and polished woodworking tools, point unmistakably to some northern, primarily, I should say, northern *forest*, connections, and they continue to pose a series of problems not yet convincingly answerable, even with the newer knowledge of Eskimo and Indian prehistory and the greatly extended radiocarbon chronology which has more than doubled, in the past

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few years, the estimated span of Dorset cultural development (Rainey and Ralph, 1959, pp. 370-3). Despite this greater age for Dorset and other evidence of long occupancy of the eastern Arctic, I continue to question the validity of the venerable beliefs concerning major Indian and Eskimo exchanges in the northeast.

In the first place, I fail to discover the requisite detailed similarities between the two groups when the Dorset and its predecessors in the eastern Arctic are compared with the Archaic Indian cultures of the northeast. Secondly, it still seems to me that the temporal priority of the most diagnostic traits shared by Eskimo and Indian, rests with the Indian group.

To develop these theses briefly requires first a summary consideration of the Dorset and pre-Dorset cultures, including the Sarqaq and Independence complexes (Meldgaard, 1952; Knuth, 1954; Collins, 1950; 1955; 1956a; 1957a; Harp, 1951; 1953), which, in marked contradistinction to Archaic Indian complexes, have small-tool industries featuring burins, microblades, and cores, which apparently relate them to the western Arctic manifestations of Giddings's Cape Denbigh complex and its Alaskan and Canadian congeners (Giddings, 1951; Larsen, 1953; MacNeish, 1956a).

Sarqaq and Dorset share, however, a small inventory of tool and weapon forms which present parallels to certain old northeastern Indian cultures. A distinctive trait of this group is a slender lanceolate blade, with long, pointed or lobate tang, chipped bifacially with considerable skill and care (Pl. 1, *a*) (Larsen and Meldgaard, 1958, pp. 57-8; Pl. 1, II, 5, 6; Pl. 4, 15-20; Mathiassen, 1958, pp. 16, 18, Fig. 6, 3, 6-8). It occurs with several variations in the Sarqaq strata at the Disko Bay stations and almost certainly carries over into Dorset, but not, according to Collins (personal communication), as a prominent type (Wintemberg, 1939, pp. 95-6; de Laguna, 1946, p. 136). A very similar point occurs in presumably early Indian sites in the Maritime Provinces of Canada and in the Red Paint complex of Maine, where it is often made of a translucent white chalcedony of indeterminate northern origin, as is the case with a number of the Dorset specimens (Willoughby, 1935, Fig. 31). In more attenuated size and proportions, this point style ranges still farther south into lower New England in late Archaic times (Pl. 1, *b*).

Common also to Sarqaq and Dorset are several styles of concave edge side scrapers (Mathiassen, 1958, Fig. 6, 15, 16, p. 20; Fig. 8, 33-6, p. 32; Larsen and Meldgaard, 1958, Pl. 2, 10-12; Pl. 3, 18-24, pp. 54-5) for some of which occasional examples exhibiting close or general similarities can be found in the Laurentian, especially in the Brewerton complex thereof (Pl. 1, *c*; Ritchie, 1940, Pl. XV, 46-8, pp. 34-5; Pl. XXV, 6, 7, p. 70).

Lanceolate-triangular blades of chipped stone, regarded as arrowpoints by Meldgaard (1960a, p. 591), are characteristic of the Sarqaq complex. These are small, thin blades, with a straight or concave base and excurvate edges which are finely trimmed and sometimes serrated. Frequently grinding is present on one or both faces (Mathiassen, 1958, Fig. 6, 29; Fig. 7, 16, p. 21; Larsen and Meldgaard, 1958, Pl. 1, II, 1-3, p. 57).

The Dorset complex contains an abundance of triangular blades, referred to as harpoon points rather than arrowpoints, which may have been derived from the Sarqaq type. Dorset blades are chiefly of isosceles form with mildly convex or straight, often finely serrated edges, and a sometimes thinned, concave, or occasionally straight base. Many are unifacially worked, or but slightly

chipped marginally on one face, which often bears a medial ridge bounding two flake scars (de Laguna, 1946, p. 137). I am in agreement with de Laguna and Wintemberg that the distinctive peculiarities of these Eskimo points outweigh in importance their general formal resemblances to northeastern Indian forms (Pl. 1, *e, f*).

There are also distinctive Dorset traits, not reported for Sarqaq, for which Indian connections have been postulated. Some students have taken them, mainly, south from the Arctic, others have viewed them, in part at least, as having been diffused into the north. These are the barbed bone dart points, eyed bone needles, single and multiple side-notched chipped stone blades, asymmetric chipped stone knives, ground stone knives and points, end scrapers with expanding edge for graving points, steatite pots and lamps, and possibly the bone comb.

Dorset barbed bone dart points are in reality very little like Indian examples from the northeast. Perhaps the nearest resemblance concerns certain recent Eskimo slate leister prongs and similar objects from Red Paint sites in Maine (de Laguna, 1946, p. 120).

Eyed bone needles do occur sparingly in the northeastern Archaic. One example comes from the radiocarbon-dated Frontenac Island site in central New York (Ritchie, 1945, Pl. 10, 15).

The Brewerton complex of Laurentian, in particular, produces somewhat Dorset-like chipped stone points with single or multiple side-notches, also crescentic-edged side scrapers, and peculiar crooked knives reminiscent in some degree of Dorset objects (Pl. 1, *g, h, m, n, o*; Ritchie, 1940, Pl. XV, 46-8; Pl. XXV, 7, 17, 18).

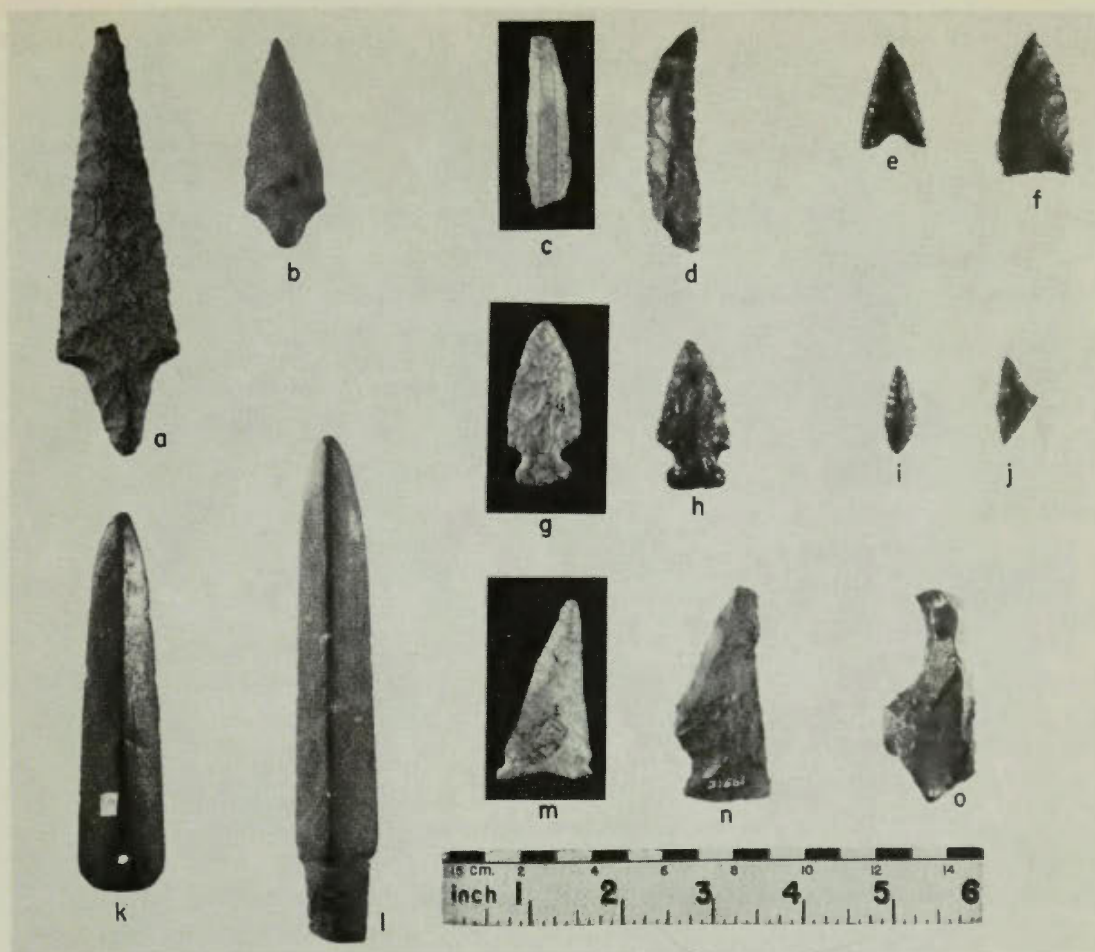
The Brewerton, Frontenac, Vergennes, and other Laurentian complexes have yielded chipped and ground semilunar knives and rubbed slate double-edged knives and points. A much wider assortment of ground slate points, but no semilunar knives, are found in the Red Paint complex of Maine. De Laguna (1946, pp. 123-35) has pointed out in close detail the resemblances and the more numerous differences which exist between this group of Indian origin and the Dorset rubbed slate assemblage, of which the ulu is not certainly a constituent.

Expanding edge end scrapers with graving points, a good Dorset form, occur in the Paleo-Indian, but not in the Archaic complexes of the northeast (Byers, 1954, Fig. 92, *a*).

Finally, with regard to the Dorset soapstone pot, apart from the wide diversity in shapes represented by Indian examples from the late Archaic and transitional cultures of the northeast, there is also a considerable unbridged geographic gap. I think there is good evidence to suspect that, with respect to the Indian cultures, the working of steatite spread from the Piedmont area of the middle Atlantic states into the northeast and our Carbon-14 dates place it in the eastern Long Island Orient complex by at least 1000 B.C. (Ritchie, 1959, pp. 62-4, 74-6).

From this relatively recent 1000 B.C. point in the radiocarbon chronology of the northeast, begins the backward journey into dark time, some 2,000 additional years, to the earlier stages of the Archaic in which are found the assumed Dorset Eskimo connections.

Since there is need for brevity, a simple listing of pertinent dated sites will suffice. Rubbed slate points, barbed bone points of several types, an eyed

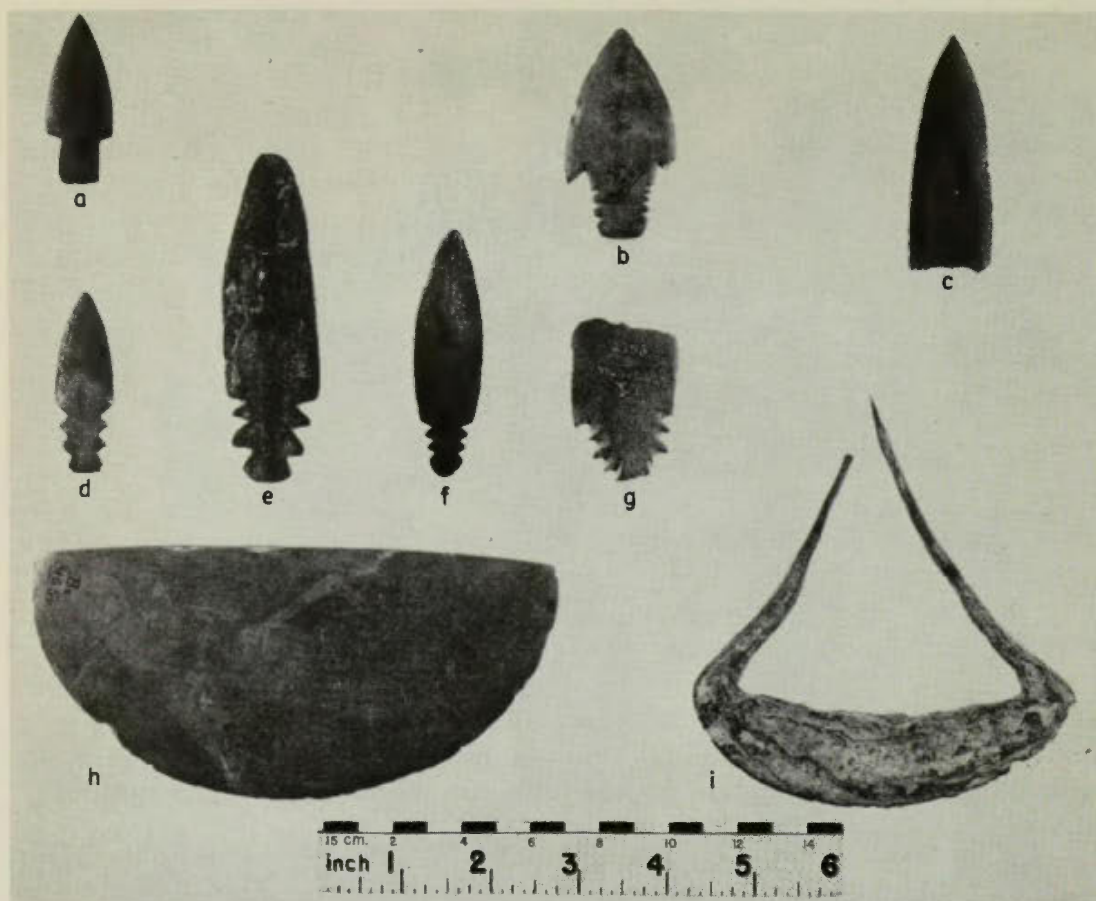


PL. 1. Similarities in some Dorset (left) and northeastern Indian artifacts.

a, b, tapered base points; *c, d*, lamellar flakes, *d* is marginally retouched; *e, f*, triangular points; *g, h*, side-notched points; *i, j*, side blades; *k, l*, rubbed slate "bayonet" points with diamond-shaped cross-section, *k* has broken and reworked base and is perforated by gouging from either side; *m, n*, asymmetric knives; *o*, Indian crescentic-edged side scraper.

Provenience: *a*, Anse L'Amour, Forteau Bay, Labrador; *b*, southern Mass.; *c*, Sop's Arm, northern Newfoundland; *d*, Laurentian culture, Livingston Co., N.Y.; *e*, Englee, northern Newfoundland; *f*, Laurentian culture, Robinson site, Brewerton, N.Y.; *g*, Anse L'Amour, Forteau Bay, Labrador; *h*, Laurentian culture, Oberlander No. 1 site, Brewerton, N.Y.; *i*, Sop's Arm, northern Newfoundland; *j*, Lamoka culture, Woodchuck Hill site, Scottsville, N.Y.; *k*, Jackson Arm, northern Newfoundland; *l*, Laurentian culture, Cross Lake, N.Y.; *m*, Sop's Arm, northern Newfoundland; *n*, Laurentian culture, Onondaga Co., N.Y.; *o*, Laurentian culture, Oberlander No. 1 site, Brewerton, N.Y.

a, c, e, g, i, k, m, from A. H. Mallery collection, courtesy of American Museum of Natural History; *b*, courtesy of R. S. Peabody Foundation for Archaeology, Andover; *d, l, n*, New York State Museum; *f, h, j, o*, courtesy of Rochester Museum of Arts and Sciences.



Pl. 2. Similarities in ground slate, ground bone, and native copper artifacts.

a, slate point, Laurentian culture, East Sugar Island site, Rice Lake, Ontario; *b*, slate point, Laurentian culture, Brewerton, N.Y.; *c*, slate point, near Pyongyang, North Korea; *d*, bone point, Laurentian culture, found with *a* on East Sugar Island site; *e*, copper point, Old Copper culture, Fond du Lac Co., Wis.; *f*, copper point, Old Copper culture, Waupaca Co., Wis.; *g*, slate point, Laurentian culture, Watertown, N.Y.; *h*, slate ulu, Laurentian culture, Clay, N.Y.; *i*, copper knife, Old Copper culture, Waupaca Co., Wis.

a, *d*, courtesy of Rochester Museum of Arts and Sciences; *b*, *c*, *h*, New York State Museum; *e*, *g*, *i*, courtesy American Museum of Natural History; *f*, courtesy Milwaukee Public Museum.

bone needle, a carved single piece antler comb, and a probable slate ulu fragment came from refuse and burials on Frontenac Island (Ritchie, 1945), for which the following radiocarbon dates on hearth charcoal have been obtained: 2980 ± 260 B.C. (C-191) (Arnold and Libby, 1951, p. 114); 2013 ± 80 B.C. (Y-459) (Deevey, Gralenski and Hoffern, 1959, p. 161), and 1723 ± 250 B.C. (W-545) (Rubin and Alexander, 1960, p. 180).

Chipped and ground slate ulus were recovered at the Bannerman site in the Hudson valley, where a radiocarbon date of 2524 ± 300 B.C. (M-287) was obtained from a hearth (Ritchie, 1958, p. 67; Crane and Griffin, 1958a, p. 1,100).

At the Archaic Wapanucket No. 6 site, Plymouth County, Massachusetts ground slate ulus were present both in the village area and in a grave. A hearth at this settlement of circular lodges dated to 2300 ± 300 B.C. (M-764) (Robbins, 1960, p. 32; Crane and Griffin, 1959, pp. 184-5).

The upper part of an early Boreal Archaic level at the Ellsworth Falls site in Maine, which yielded simple stemmed, ground slate points was dated, according to Byers, the excavator, at 2009 ± 310 B.C. (M-89) (Byers, 1959, pp. 244, 249; Crane, 1956, pp. 667-8).

Currently we are investigating a still undated site in southwestern Vermont which is producing a Laurentian assemblage including the ground slate ulu, rubbed slate double-edged knife and point, gouge, plummet, native copper gorge, chopper, and heavy side-notched ("Otter Creek type") point.

By contrast, Collins's early Dorset T 1 site on the south coast of Southampton Island gave dates ranging from 675 to 103 B.C. (Collins, 1956a; Rainey and Ralph, 1959, pp. 370-1); the pre-Dorset Sarqaq layer at Mathiassen's Sermermiut site near Jakobshavn dated to 790 ± 100 B.C. (Mathiassen, 1958, p. 22); a few miles to the north on Disko Bay the Sarqaq site itself, excavated by Larsen and Meldgaard (1958), yielded a date of 810 ± 100 B.C., indicating that the Sarqaq culture in the Disko Bay district of west Greenland flourished between approximately 700 to 900 B.C. (Mathiassen, 1958, p. 22).

Taylor (1959b, p. 15), who has recently reviewed the data surrounding the Dorset problem, believes that the Dorset "likely began about 1,000 B.C. and lasted until about 1,350 A.D. as a distinct entity in some regions."

Although the age of the Dorset culture in the eastern Arctic has been pushed back some 1,500 years from its assumed pre-Carbon-14 antiquity, it still falls short, by an equal span of 1,500 years, of the radiocarbon-dated Archaic sites in the northeast which include the rubbed slate ulus, knives, and points, and the other artifacts of supposed Eskimo derivation. The current evidence then seems still to support my earlier expression of doubt (Ritchie, 1951a) that the Dorset Eskimo could have been the donors of the ground slate industry and associated traits above enumerated, to the Archaic Indian cultures of the northeast.

I hasten to add that the source or sources of these traits to the Archaic Indian groups of the northeast are still obscure. Linton, I believe, first suggested bone and copper prototypes for the rubbed slate knives and points. We now know for sure that such forms exist in the Archaic cultures of the wide region extending from the upper Great Lakes into the northeast (Ritchie, 1949, Fig. 4w, aa; 1962¹, Pl. 2, d-i) especially in the Old Copper culture, dating back at least to 3000 B.C. (Pl. 2, e, f, i). These metal tool forms are then, it would seem, older than any known corresponding forms of Eskimo manufacture.

¹All 1962 dates refer to this volume.

GENERIC PROBLEMS AND NEW EVIDENCE IN THE ANTHROPOLOGY OF THE ESKIMO-ALEUT STOCK

William S. Laughlin

The constant addition of new facts concerning the anthropology of the Eskimo-Aleut stock requires an equally constant cross-examination. Such facts, derived from excavations, linguistic and ethnological analysis, and from biological studies, do not speak for themselves nor do they constitute evidence in the absence of specifically formulated problems together with their appropriate premises. Studies of Eskimos and their neighbors have been carried out for over four hundred years, and in especially critical form for over one hundred years. The literature is vast and likely exceeds that published for any other group with the possible exception of Indians of the American southwest, who differ in belonging to more than one linguistic stock. It is likely, for example, that the total body weight of all the Polar Eskimos who have lived and died since 1818 has been surpassed by the total weight of books and articles published about them since their discovery by Europeans. It is pertinent to ask whether this major effort in anthropological research has actually resulted in the solution of problems that were raised, what the nature of these problems has been, and whether or not some solutions are actually at hand, contained in data already collected. Finally, to what extent might it be useful to reformulate existing problems or formulate new problems.

The study of Eskimos, Aleuts, and contiguous peoples has benefited uniquely from the variety of talent devoted to it. This talent included not only anthropologists of all branches but scientists of a great variety of disciplines including botanists, geologists, ornithologists, mammologists, and physiologists, to name only a few. Navigators and missionaries have added similarly valuable data. This study has also benefited from the fact that the investigators have been derived from many different nations including more than those with territorial interests in the Arctic and Subarctic. The heterogeneity of the investigators presents still another important facet owing to the long period of observations involved. Naturalists and natural scientists were well represented over a century ago and often provided ecological data, with details of methods of hunting, that could scarcely be improved upon. Aedelbert von Chamisso's 1824 study of Aleut whaling is a case in point with many parallels. Curiously, Chamisso is better known as the author of *Peter Schlemihl*. Pilling's 'Bibliography of the Eskimo language' (1887) which begins with an entry for 1656, and Birket-Smith's study (1959) of the earliest Eskimo portraits with dates such as 1577, indicate the diversity of observations made at an early date. Winslow's 1722 description of a female Eskimo skull from west Greenland, is the first anthropological description of a human skull, as well as the first venture into

craniometry of the Eskimos. The remarkably detailed ethnographic descriptions of west Greenland (Cranz, 1767) and of the eastern Aleutians (Veniaminov, 1840) provided suitable materials for comparative studies within the Eskimo-Aleut stock. Chamisso for example found a great affinity between the Aleut and Eskimo languages, as well as a physical affinity between their speakers.

A detailed listing of theories of the origin of the Eskimos is given by Hrdlicka (1930, p. 333). Steller, Cranz, and Blumenbach head the list of thirty-three authors favoring an Asiatic origin; Prichard and Rink initiate the list of fifteen authors favoring an American origin; and Lartet and Christy, and Dawkins head the list of eight authors favoring a European origin or important connection with Europe. Aside from suggesting that the majority opinion was correct I think there are two observations and one inference that can be drawn from the above thumbnail sketch of Eskimo studies, or more accurately from the compilations of Pilling, Birket-Smith, and Hrdlicka:

- 1) An early and enduring concern has been that of origins and affinities of the Eskimos. This concern includes affinities between various groups within the Eskimo-Aleut stock, especially affinities between eastern and western Eskimos, and between Aleuts and Eskimos.
- 2) The study of origins and affinities has made use of linguistic, ethnological, and physical data, and generally in discrete and sophisticated form.
- 3) Archaeological investigations as such started comparatively recently, essentially at the beginning of the twentieth century. Consequently, Eskimo archaeology has been influenced to a large extent by problems resulting from vigorous biological and cultural investigations and intellectual controversies which antedate it by more than a century.

As a consequence of the heterogeneity of the studies and of the investigators, of the long period of time involved, and of the extent and detail of the observations, contemporary students of the Eskimos owe a greater debt to their predecessors than those concerned with other peoples, and it is possible, I think certain, that this debt extends to well-formulated and basic problems as well as to valuable data.

The continuity and durability of generic problems in Eskimo studies has many interesting aspects, some of which offer a partial explanation. There has been an unusually cohesive body of students at any one period, and this community has maintained organic connections with preceding workers. Thus, in the eastern area all contemporary students make use of Birket-Smith's studies, who in turn made use of Boas, and Boas made generous use, by reading and correspondence, of Rink's studies, and Rink made use of Cranz, who in turn derived much from Egede. In the western area Hrdlicka made much use of Jochelson's studies, Jochelson of Veniaminov, Veniaminov of Chamisso, and Chamisso of Steller. The actual relations have been much more reticulate than is indicated by citing only two pathways. In addition, a number of researchers, Birket-Smith, E. W. Hawkes, L. M. Turner and many others, have worked in both eastern and western areas.

Aside from W. H. Dall's excavations in the Aleutian Islands (1877), and until the work of W. Jochelson in 1909 and 1910 (1925), Eskimo archaeology consisted of the examination of collections derived from mummy caves, "death houses", and contents of exposed stone graves. These kinds of unexcavated archaeological collections erased the somewhat arbitrary distinction between ethnographic and archaeological specimens. The fact that Eskimos continued

to use the kinds of artifacts excavated by anthropologists, occasionally the artifacts excavated by anthropologists, has been a most happy circumstance for the interpretation of such specimens. A number of the early researchers made anthropometric measurements, collected ethnographic information, and did a little digging. From the mid-twenties on, Eskimo archaeology was characterized by a florescence of field work, carried out for its own sake. Still another unique influence is the continuing survival, with continuing productivity, of many of the original founders of Eskimo archaeology, such as D. Jenness, T. Mathiassen, H. B. Collins, J. Ford, and Otto Geist.

It is commonly remarked that the Eskimos display an unusual congruence of race, language, and culture. This is due in part to the fact that such a congruence exists, but equally important is the fact that the observers concerned themselves with the problem of the relation of race, language, and culture. Eskimo archaeology was predestined to a rich role owing to the major problems which had been formulated and tested in this area, problems of origins, affinities, history, growth, and change, and relationships of biological, cultural, and linguistic phenomena. Accompanying these interests was the splendid nature of the remains of a culture well represented in durable materials, bone, stone, and ivory, and the descriptions of living groups of Eskimos, many now extinct, which provided the means for investigating the function and meaning of artifacts as well as their form. The integration in Eskimo studies, and the generally holistic approach has resulted both from the anthropological tradition of the corporation of investigators and from the nature of the materials upon which they elected to perform their researches.

Origin and affinity of the Eskimo-Aleut stock

The place of the Eskimos in the natural world of man was among the first, if not the first generic problem posed by European investigators. J. B. S. Haldane has suggested that anthropologists are mainly interested in differences between human groups, less so in the differences within groups, and rather little in the characters common to all groups (Haldane, 1956). Whether or not this represents a consensus of opinion, it does suggest an orderly approach. A rather full history of the estimates of the position of the Eskimos has previously been cited. One name is notable for its absence from the list provided by Hrdlicka, that of Lewis Henry Morgan.

Set squarely in his chapter, "System of relationship of the Eskimo", is a table of cranial measurements (Morgan, 1871, p. 270). If at first glance this seems out of place, a study of this chapter from the standpoint of problem and method must elicit admiration. Morgan notes that the separation of the Eskimo from the remainder of the American aborigines is a question of great importance in American ethnology, and adds, "Their system of consanguinity and affinity was sought with special interest for the bearing it might have upon the solution of this problem" (Morgan, 1871, p. 269). His summary statement reflects his successful answer to this question:

"The separation of the Eskimo from the Indian family was one of the striking results of Dr. Morton's original and interesting investigations. Whether his premises are sufficient to sustain this inference, or otherwise, the latter is confirmed by the evidence contained in their system of relationship, which also separates them by a clearly defined line from the Ganowánian family, as well as from the Turanian and Malayan." (Morgan, 1871, p. 269).

It is worth recalling that Morgan studied the famous Eskimo couple and their child, who were brought to New York from Frobisher Bay by Captain C. F. Hall. He carefully remarks that it is impossible to generalize on the characteristic features of a people from a few isolated representatives but that such an examination might suggest the more general points of agreement and of divergence. His observations on the protuberant occipital region and pigmentation are as detailed as those on the kinship system. Aside from correctly noting the separation between Eskimos and Indians, the most interesting part of Morgan's treatment is his willingness and ability to use diverse kinds of data.

The degree of physical similarity between two groups reflects the degree of separation between them. While geographical barriers are among the most common deterrents to gene exchange and therefore to similarities, cultural barriers of themselves and in combination with other cultural and physiographic boundary-maintaining mechanisms, may inhibit or prevent exchange of mates and genes. Approximately the same principle applies to both biological and cultural phenomena, at least over a period of several generations. If the Eskimos were simply another group of American Indians with a misspelled name our entire view of their history, and that of the American Indian, would have to be seriously revised.

As Boas noted in 1902 the discovery of a non-Eskimo group would make a considerable difference:

"The problem of the earliest inhabitants of Alaska can certainly be solved by the archaeological investigations. The implements of the Eskimo and their physical type are so characteristic that they cannot be mistaken for anything else. If the most ancient shell-mounds of the east coast of Bering Sea, of which there are a great number, should reveal a type different from the Eskimo and a culture different from that of the Eskimo, we should have a distinct proof of a population preceding the present inhabitants of Alaska." (Boas, 1902, p. 6).

Boas placed his finger on a generic problem of enormous import, and if his statement is rectified in terms of contemporary facts, it still phrases an inquiry we must continue until the biological and cultural history of the Eskimos is adequately known. In puzzling out the history of a group of peoples it is pertinent to distinguish between five situations and combinations of them:

- a) Has a particular group evolved locally?
- b) Has the group migrated from another area, remote or near?
- c) Has the group been changed by mixture with dissimilar or similar groups?
- d) Has the mixture been of a rather subtle sort involving gene flow resulting from occasional mating across cultural lines but without permanent exchange of mates, or a more frequent and rather permanent exchange of mates?
- e) To what extent has the group changed biologically without cultural changes, to what extent has the culture changed without biological change, and to what degree have these been interrelated?

Phrased in terms of the history of a site or an area, we want to know if continuity or replacement of the peoples who have lived there has been characteristic.

It is possible to move from Morgan and Boas to contemporary investigations, such as those of G. Debetz, J. B. Jørgensen, B. Chown, and N. G. Levin, and see the continuity in the problem and the progress in its solution. G. Debetz (1959) raises the question of factors causing the difference in physical type between American Indians and Asiatic Mongoloids, and whether or not

the American Indians entered the New World before classical or Asiatic Mongoloids had evolved in recognizable form. The discovery of Liukiang Man in southern China, a late Pleistocene man associated with extinct animals and displaying some traits suggestive of Mongoloid physiognomy, certainly indicates the likelihood that Mongoloids had not come into being until after the American Indians. It does seem increasingly probable that there were no Mongoloids at the time of the first arrivals of American Indians. I should like to insert a possible corollary, that the Eskimos, including the proto-Eskimo-Aleuts, may have reached the eastern shores of Bering Sea at the same time or soon after Mongoloids as such had evolved in the Far East.

This presumes the likelihood that they evolved in those regions where they are most numerous today and second, that those living along the coasts of Asia developed the necessary population size and pressure to migrate because of their successful exploiting of marine resources and third, that they migrated early in their evolutionary history owing to the ease of following the coastline as well as to having the choice of entering new coastal regions without competing with others already there. The difference between a coastal economy and that of hunters of migratory land mammals is probably considerable and critical. One major characteristic of coastal populations, seen in the arctic Eskimo area and in the Aleutians, is their spread into new areas leaving continuously occupied sites behind them, rather than vacating the area from which they migrate. The migration of the Eskimos in both directions around Greenland, extending their area by population growth and movement so that there was some occupation along the entire coast with the exception of such inhospitable areas as Melville Bay and the Blossville Coast, is an example of this kind of migration pattern.

Many repetitious discussions of the origin of the fat padded-Mongoloid face as a result of climatic engineering, a response to dry cold, are misleading as well as empirically unfounded. If response to cold is responsible for the design of the Mongoloid face, a dubious thesis unsupported by physiological testing, wet-cold rather than dry-cold would be an equally or more plausible speculation owing to the well-founded fact that heat loss is much more rapid when the skin is wet. In any event, Siberia should not be used as a homeland or evolutionary cradle for Mongoloids in the absence of early proto-Mongoloid skeletons, and in face of the presence of such skeletons in both south and north China (Liukiang and Chou Kou Tien).

Writing in 1902 Boas was best informed on the recent central and eastern Arctic Eskimos. Like many other authors he uses these for the type model. This is a case of the tail wagging the dog. I shall presently elaborate the thesis that any groups who were forced to place great reliance upon dogs were obviously in marginal areas where a large part of their efforts were consumed in keeping the dogs alive and these Eskimo groups were necessarily small and culturally less productive than those who lived in the more luxuriant areas to the west. The homogeneity of the central and eastern Eskimos is in large part due to the recency of their migration into these areas compared with the earlier occupation of the eastern shores of the Bering Sea. It should be born in mind, however, that the eastern Eskimos are sufficiently diverse that physical differences between their groups are useful in tracing their routes of migration (Laughlin and Jørgensen, 1956).

The Ipiutak skeletal remains, analyzed by G. Debetz, throw much light upon the composition of Eskimos generally, upon earlier populations, and upon

their relation to Asiatic Mongoloids still residing in Asia. Comparing the Ipiutak and Tigara series Debetz notes first that both series belong to the northern branch of the Mongoloid stock (Debetz, 1959), and that the traits distinguishing them from American Indians are distinctly apparent. Second, he notes that two traits distinguishing the Ipiutak from the Tigara series, lower cranial vault and lack of bizygomatic dominance over cranial vault breadth, do not distinguish the Ipiutak series from all the Eskimos, but only from the central and eastern ones. Further, "The difference between them and the Western Eskimos, particularly the Asiatic ones, as well as the Chukchee, is considerably less pronounced. The low or moderate height of the cranial vault is also a well-known characteristic trait of Aleuts and pre-Aleuts." (Debetz, 1959, p. 59).

Comparing Ipiutak with similar series he notes that (a) in proportions of the cranial vault they are similar to Yugaghir and pre-Aleuts, (b) in profile (orthognathism) they are similar to Yukaghir but differ from Aleuts and pre-Aleuts, and (c) in shape of orbits and nose they are similar to Aleuts and pre-Aleuts but differ from the Yukaghirs. This provides a useful picture of diversity among the various related members of the Eskimo-Aleut stock, and it occurs early enough in time to infer a much longer period before Ipiutak and pre-Aleut for the existence of a common proto-Eskimo-Aleut population. It is entirely possible that we may find evidence of an ancestral population or group of closely related populations which includes ancestors of such contemporary groups as the Chukchi and others of Asia, but not of American Indians.

The presence of "true" or "typical" Eskimos in the Old Bering Sea cemetery at Uwelen found by M. G. Levin (1959b), who were already in existence at the time of Ipiutak Eskimos, and the simultaneous existence of pre-Aleuts (termed Paleo-Aleuts if continuity with the later Aleuts is to be emphasized) indicates an early diversity. If such diversity existed in 1000 B.C., and this is indicated for the Aleutian Islands, then we must look much further in the past for common ancestors. A major part of our problem is well phrased by Debetz:

"Turning to suppositions, or, to be more exact, to the formation of tasks for further studies, it should be admitted that the common ancestors of the 'Ipiutakians' and the 'Tigarians' were related to the ancestors of the Aleuts. It is somewhere at this stage that we should look for connections with the ancestors of the modern Yukaghirs, but these questions obviously need further elaboration." (Debetz, 1959, p. 64).

The differences between the Ipiutak and the Tigara series would require much more time, than the estimated thirty or forty generations which separate them, if the Ipiutak people had been ancestral to the Tigara people. The use of generations for measuring elapsed time, by Debetz, is an extremely useful method of appreciating the intervals which separate or join related peoples. The migration pattern of coastal Mongoloids assumes great genetic significance because the degree of divergence would be somewhat minimized by continued gene flow between newly formed migrating isolates and the contiguous sedentary isolates remaining behind. The estimate of 4,600 years elapsed time for the separation between Eskimo and Aleut languages could conceivably turn out to be accurate (within a thousand years) for their physical separation. Going back to 4000 B.C. we may very well find the common ancestors of the Eskimo-Aleut stock and of other Asiatic Mongoloids such as the Chukchi on the eastern shores of the Bering Sea. If the Siberian Eskimos moved from Alaska to Siberia, as their Yupik language affiliation indicates, there may well have been

other movements from east to west. The current investigations of Shoichi Ito (personal communication) on the skeletal remains of the Moyoro Shell Mound, Hokkaido, may throw some light on early populations of the Bering Sea region and the North Pacific region generally. They are Mongoloid, quite unlike the Ainu, and are more similar to Neo-Aleuts than to Paleo-Aleuts. This does not mean, of course, that they are more similar to Aleuts than to some other Mongoloid group in the intervening area but only that a noteworthy affinity is seen. If there should prove to be a pronounced similarity between Moyoro and Aleut we should then have another case of parallel or convergent evolution. The other alternative would be to resort to the old idea of direct movement of people across the Pacific, by way of Kamchatka, the Kommandorski Islands, and across to the Aleutians. One point of progress since the time of Hrdlicka's 1930 map showing a migration over the latter route, is the abundant linguistic, cultural, and physical evidence that the Aleutian Islands were invaded from the Alaska Peninsula.

Concerning new evidence, both the blood group systems and various discrete traits on the skeleton are becoming sufficiently well known to confirm the dichotomy between Indian and Eskimo populations, and to estimate affinities between the various sub-groups of the Eskimo-Aleut stock. The figures which G. Debetz has provided me on the frequency of various morphological traits in the Ipiutak and Tigara series clearly support his anthropometric findings. The relative frequencies of the mandibular torus and the palatine torus show the same predominance of the mandibular torus, as among Aleuts and Greenlandic Eskimos.

Returning to the statement of problems concerning population replacement or continuity, we can summarize the present picture of the populations of the Bering Sea region by noting that (1) the earliest groups known display diversity between co-existent groups and we therefore have not found a single ancestral population, (2) the time interval between Ipiutak and Tigara is too short for the direct derivation of Tigara people from Ipiutak and, therefore, this is an example of population replacement, within the Eskimo-Aleut stock at this site, (3) there does appear to have been continuity and local evolution in the Aleutians, Kodiak Island, and along the Kuskokwim River (Laughlin, 1958). It should be emphasized that adequate series are not yet available for a dogmatic statement that local evolution appears to have been more important than population replacement in southern Alaska, (4) all the skeletal series so far discovered are non-Indian and fall within the category of Eskimo-Aleut-Mongoloid, including those who may belong to a proto-Eskimo-Aleut phase. We cannot rule out the possibility that skeletons of American Indians may be found in Alaska or in Siberia, for they clearly entered the New World earlier than 20000 B.C., and they moved through Alaska. It does seem increasingly unlikely that Indians will be found with the combinations of material traits that can be assigned to the Eskimo-Aleut culture. Put in more stark terms, it appears that whenever we find evidence of the use of throwing boards, lamps, three-pronged bird spears, skin boats, various kinds of harpoon heads and knives, we may also expect to find Mongoloid skeletons of the Eskimo-Aleut stock.

On the other hand, are all Mongoloid skeletons found in the Eskimo-Aleut area to be assigned membership in the Eskimo-Aleut race? The situation

appears to be one in which the Eskimo-Aleut language and culture was assembled in its characteristic and recognizable form in Alaska. The people responsible for this development are Eskimos and Aleuts, and before them, proto-Eskimo-Aleuts. We do not know whether all the characteristic forms, most of them, or only a few of them, had been developed by 2600 B.C. when the linguistic separation between Eskimo and Aleut is estimated to have taken place. All the people involved are Mongoloids and their ancestors came only from Asia.

Our problem is partly one of identity, of recognizing both container and contents, and as such is one which can be broken down in various ways. The term Eskimo or Aleut, can be applied to intellectual and material culture, to language, and to physical types and breeding populations, separately or in combination. We are approaching a period in time, prior to 1000 B.C., where the use of standard labels may be misleading and where the creation of new labels may tend to serve as temporary substitutes for more synthetic analysis. What appears to be a massive amount of information concerning Eskimos as a total group, appears much more modest when we refer to the information available for a particular period or a single site. Where ample evidence exists we make corrections for missing items that are critical in the interpretation of an archaeological site. The Polar Eskimos and the Sadlermiut are faithful examples of linguistically and biologically defined Eskimos whose cultures were deficient in many traits ordinarily regarded as typical for recent Eskimos. In the case of many of the core and blade or microlithic industries of the north, only their location serves to suggest an affiliation with later Eskimo cultures. The same industries found in non-Eskimo culture areas would not be identified as Eskimo, or rather, are not identified as Eskimo.

Unfortunately, material culture must reflect necessary adaptation to local economic pursuits, and must therefore change much more rapidly than linguistic or genetic systems. Sleds cannot be used on open water, and kayaks are of little use in fast ice. Such correlations, magnificently illustrated by Steensby in 1916, are easy to appreciate. The correlations will not, however, account for all absences. Whether the Ipiutak people had no interest in whaling, or whether there were no whales available, or whether the same people did their whaling somewhere else, has not been determined. Further, where skeletons of whales are found in archaeological sites the question of how they died remains critical. To date no method has been found to distinguish the skeleton of a whale which died a natural death and was recovered after stranding, from that of a whale which died as a result of being netted or harpooned.

What I have referred to as a problem in identity, which is different though affected by the amount and kind of evidence available, has been aptly discussed by Sapir in commenting on the futility of the quest for true origins:

"This is not the place to develop the thesis that the only conceivable kind of culture origin is the association into a functional unit of cultural elements already in existence in unassociated form. From this point of view any stage in the history of a culture element is fully as much an origin as the reconstructed or hypothetical starting point. Origins, as ordinarily understood, are set off from other points of a cultural sequence merely by more or less arbitrary relative evaluations of such points; to the 'origin' is attached greater significance, for whatever reason you please, than to the immediately preceding and following points of the sequence." (Sapir, 1916, cited from Mandelbaum, 1949, footnote, p. 413).

The old problem of origins in the study of Eskimos has been especially fruitful in part because the Eskimos are known to be highly inventive and more cases of local invention are admitted than with most other peoples. In the case of the biological identification of ancestral populations, the physical anthropologist must work with estimates of degree of similarity between the groups provided, regardless of the labels applied. In general terms the problem of the origin of the Eskimos has been solved, they are displaced Asiatics. Now we are concerned with the relative amounts and rates of evolution that took place in the different places in Siberia, Alaska, Canada, and Greenland.

Relevance of ecology and technology to the evolution and distribution of Eskimos

The single point which I should like to emphasize here is that many of the generic problems are affected significantly by population composition and size and their correlates. Age at death is a variable fully as much as blood type B and it may have more significance for biological and cultural history than the gene for B or the osteological traits which have traditionally received much more attention.

The relations of the Eskimos to their ecological base has been considered from the earliest studies onward. Much of such data is conveniently summarized in the writings of Steensby (1916), Kroeber (1939), and Freuchen and Salomonsen (1958). The influence of environmental factors has also received much sophisticated treatment which can also be easily documented:

"Investigators of Arctic peoples have consistently stressed environmental conditions not because they determine these cultures any more exclusively than elsewhere, but because they are so obtrusive as co-determinants. Eskimo life is a constant interplay of geographical and cultural factors." (Lowie, 1937, p. 260).

Thus, the interplay of factors is familiar territory. Some of the derivatives have not received full attention. The problem may be approached by treating the interrelations of four composite items: (1) ecological wealth, (2) isolate size, composition, and distribution, (3) continuity in temporal succession, and (4) cultural complexity. These can be illustrated most simply by a comparison of two extremes, the Sadlermiut Eskimos of Southampton Island and the Unalaska Aleuts. These two groups are characteristic of larger areas, and the processes at work among them presumably apply generally.

The important items under ecological wealth include the kinds and numbers of sea and land mammals, birds, fish, shellfish, and plant foods both of the land and the sea. Under the category of availability must be their distribution at different times of the year. The peoples of southern Alaska could more often avoid starvation in March by using various algae and the shellfish even when storms prevented them from going to sea. Ice prevented the Sadlermiut and similar peoples from replenishing depleted food stores at various times of the year and there were not the various algae and plant foods to fall back on.

Another correlate is that of physiographic features such as complexity of coastline and ocean currents. In brief, the more complex the physiographic features, the more ecological niches accessible to a hunter, holding either time or distance constant. The values of a complex coastline to a hunter, and much

other valuable data of pertinence to economic exploitation of the environment is given in "The economics of seals in the eastern Canadian Arctic" (McLaren, 1958).

Procurement problems offer still another correlate. One thousand pounds of polar bear meat is approximately as good as one thousand pounds of seal meat or muskox. Southampton Island is probably second to none in polar bear density, but it likely heads the list for numbers of Eskimos eaten by polar bears. Similarly, stranded whales have always been used as well as harpooned whales. Again, the island chains and those with complex coastlines have an advantage in collecting stranded sea mammals as well as driftwood. The driftwood supply of the Aleutians was especially abundant and included both Asiatic and North American woods. The paucity of driftwood in the Southampton area is well known.

A correlative value of stranded materials, meat and wood, and of foods exposed at low tide, such as algae and shellfish, is the sustenance it provides for aged women, children, and temporarily disabled persons, including partially immobilized women such as those in various stages of pregnancy.

Among the technological correlates even the most brief summary requires an observation about the relative economics of dogs and kayaks. Though I have not yet been able to assemble good statistical data the difference between the two forms of transportation is sufficiently clear cut to make some pertinent observations. Kayaks obviously do not need to be fed, all the animals brought back by the hunter go to his family and other dependents. Sled dogs must be fed, they often eat the same food and as much as a man, and further, they often need food acutely at the same period of starvation when the Eskimo needs it, and when he most needs their support to get it. Arctic literature has many such examples, unfortunately not in a form that can be tabulated. It is apparent that Eskimo dogs are not fed as much as they would like, nor as much as the drivers, nor, perhaps, as much as they need for efficient performance. The use of dog-islands alleviates the problem for some Eskimo groups, others simply look the problem squarely in the face and walk on by the dogs. In any event, feeding dogs is a drain on the Eskimo economy, though a necessary one. The situation seems to be genuinely symbiotic. Increasing reliance on dogs appears to be associated with more marginal existence. Groups who must rely a great deal on dogs are disbarred from developing climax cultures or many super-subsistence parts of their culture.

Population density, isolate size, composition, and distribution are intimately related to the development and maintenance of Eskimo culture. Population density has been previously summarized by Kroeber (1939). More refined techniques now exist but the rough outlines are satisfactory for comparisons between extremes. Kroeber gives the total population size for Southampton Island as 300, and for the Aleuts as 16,000. Unalaska Island alone probably had some 2,000. The densities (100 km^2) are 1.28 and 64.70. Of more interest is the relative age at death.

For comparison we may employ the evidence of the skeletal population from Native Point, Southampton Island, representing some 182 individuals, no one of which survived the winter of 1902-3. The best comparable data is that of Unalaska Aleuts reported in 1840 by I. Veniaminov, who gives the age at death of 491 Aleuts. The maximum age at death among the Sadlermiut appears

to lie between 45 and 50 years. Among the Aleuts the maximum age at death was between 90 and 100 years. The mean difference for adults is approximately 15 years. Infant mortality presents a similar contrast. Infants and children to 4 years of age comprise some 45 per cent of the Sadlermiut series, contrasted with 20 per cent for the Aleut series (Laughlin, Merbs, and Wilson, 1960).

The greater longevity of the Aleuts provides more overlap between generations. For cultural maintenance and growth the greatest benefit lies in the greater number of knowledgeable people available to the group. In essence, there are more tutors in the groups characterized by greater longevity. More leisure time is available, considering the life span of the individual, and this is reflected in both material and non-material culture.

The existence of contiguous or closely situated villages has many genetic as well as social consequences, among which is greater stability. In an area where there are twenty villages maintaining active relations between themselves the loss of an entire village is of no great consequence. The extinction of the Sadlermiut can be matched with other examples from the central and eastern Arctic. Another derivative effect of large total population size is seen where the population size greatly exceeds that of alien groups. Thus, a real barrier to the effects of mixture between Indians and Eskimos in Alaska lay in the much greater population size of the Eskimos, a certain dilution factor for genetic contributions that succeeded in crossing the various boundary-maintaining mechanisms.

Successional continuity

Continuity in temporal succession for a particular site or local area appears to be greater in the western than in the eastern areas, and in southern Alaska than in northern Alaska. The existence of large, deep, stratified sites such as those in the Aleutians and Kodiak Island suggest very long periods of uninterrupted occupancy. Chaluka, on Umnak Island, appears to have been continuously occupied for over 4,000 years. Such sites are often found at the mouth of a freshwater stream which emanates from a lake used by spawning salmon, where there are reefs exposed at low tide, offshore islands which contribute to the variety of ecological niches both marine and terrestrial, and such features as cliffs (the use of cliff birds was greatly elaborated on King Island in the Aleutians and by the Polar Eskimos), and a generally complex coastline favorable for stranded mammals and driftwood. Ice conditions must also be favorable. The Aleutians become a special case in many ways owing to the fact that most of the annual migrations of fur seals and of whales entering Bering Sea had to pass between the islands.

Continued exploiting of the same immediate area reflects both its ecological wealth and a generally larger population size than is found in those areas characterized by single horizon sites or with only a few cultural strata indicating that the people moved away or died off. Deep, stratified sites are primarily a coastal phenomenon. This is part of the basis for postulating a difference in the pattern of migration and genetic and cultural exchange between coastal communities and those of the interior of Siberia and North America.

Cultural complexity can be illustrated with an inventory of the various kinds of communal ceremonies frequently cited as characteristic of western

Alaska and existing in much diminished form or not at all in the central and eastern Arctic. Elaborate ceremonies require larger numbers of people than the simple sessions held by individual shamans. Inviting-in-feasts flourish much more where there are nearby people to invite, in contrast with the enormous distances to be covered in issuing an invitation to visit, for example, at Native Point. While Aleutian and Kodiak villages seldom exceeded two or three hundred members, there were many small, contiguous villages. The association between cultural complexity and population numbers appears well established for many areas in the world. The Eskimo-Aleut area is unique in containing extremes within itself whereas in other areas the contrasting groups usually belong to different linguistic families.

One unifying element should be added, though its functioning and importance deserves considerably more study. This is the generally low water-temperatures in the Eskimo-Aleut area. The Aleuts had to practice a number of survival techniques, requiring various childhood training exercises, to innure themselves to the winter cold. This prominently included innurement to immersion. Falling overboard or sinking with a kayak in the Bering Sea was much more demanding physiologically than exposure to dry cold on the mainland and in the interior. Survival in the water probably ranged between eight minutes to an hour, depending on amount of clothing, condition of the individual, and his psychological toughness, where in marked contrast Eskimos on land, or on top of ice, could go for hours and days in roughly comparable emergencies. In some respects the division between High Arctic, Middle Arctic, and Subarctic, the latter where the majority of the members of the stock lived, may be overemphasized. The retention of the same kind of clothes (with local concessions to dry or wet conditions) and the same kind of harpoons, kayaks, and other material culture reflects the remarkable versatility of Eskimo technology and inventiveness.

The linguistic and physical diversity, frequently commented upon for the western regions, seems a logical and necessary counterpart of the greater time depth of the larger populations found in the western and especially southern regions.

Summary and conclusions

The generic, repetitive nature of the problems raised in the study of the Eskimo-Aleut stock has been especially fortunate in directing attention to basic problems and keeping it in focus long enough to secure some answers. This has been achieved by coping with the larger problems of the relations between race, language, and culture, and between these and the natural environment.

If the observations of Giddings (offered in his paper on "Ancient Bering Strait and population spread" (1952a)) at first sight appear at variance with those of Boas (1902), a basic similarity is soon found in the questions asked and much of the difference then lies in the larger and better information available to Giddings, as a consequence of fifty years of accumulation and analysis of data. Giddings is certainly one of the first investigators to produce a plausible picture of the movements of populations, and of the spread of isolates and populations in terms of the economic conditions under which they lived. The movement of Mongoloid groups around the Bering Sea is in many ways precisely parallel

to the movement of the Eskimos about the coasts of Greenland. In one case the Bering Sea acts as a barrier to direct crossing, confining the people to the coastal regions, in the other the Inland Ice prevents direct crossing and confines the people to the coastal regions. The difference between coastal patterns of migration, characterized by slow encroachment as the isolates expand and families fission off and establish new villages, and those of interior hunters who pick up their entire camp to take advantage of new places where they can intercept the game, often quite remote, are considerable. The genetic continuity and stability of the Bering Sea region generally, as well as the over-all cultural continuity, suggest that the diversity found there must be accorded a relatively great antiquity.

The common idea that having successfully crossed the Bering Strait man begins to search for a milder climate and, therefore, moves southward is belied by the fact that he was previously well prepared to get up to Bering Strait and that the short distances covered by one generation would have removed any memory of life at 55 degrees latitude as opposed to 65 degrees. The Eskimos settling in Greenland moved both north and south on both the east and west coasts, moving through zones classified as High Arctic, Middle Arctic, and Subarctic. Giddings's point nine (1952a, p. 99) is pertinent, "*The backward direction is the only one in which this population spread is limited*, for it is in that direction that populations have developed a stability, and have erected tribal boundaries."

It is clear that there have been some movements back and forth at Bering Strait, probably owing to a lack of many large, contiguous isolates, and the presence of suitable unoccupied sites. The situation even permits a rather dogmatic statement, "There is no doubt that the Eskimo now in Russian territory returned to Asia from America" (Voegelin, 1958, p. 57), and the same may apply to other peoples in Siberia. In any event, people at Bering Strait did not move south to the area of annual salmon runs in anticipation of undergoing a population explosion, rather, whatever families moved on to a favorable site simply had more surviving infants, more old people, and all the correlated benefits that go with increased population size.

Eskimo studies need more low-level observations to support the abstractions. There is an historical charter for specific, concrete, well-tested facts in Eskimo studies. When Giddings remarks that "The individual moves within a fixed radius of space within his lifetime. His children establish their own circles of range beyond" (1952a, p. 95) he is phrasing precisely the kind of data which we need in copious and measurable form. We need only enlarge on this example and add the information of whom the individual mated with in order to produce those children, and the genotypic and cultural characteristics of his mates, and we shall have the facts to solve the basic questions concerning the origins and affinities of the Eskimo-Aleut stock.

PART II

BERING STRAIT TO PUGET SOUND: DICHOTOMY AND AFFINITY BETWEEN ESKIMO-ALEUTS AND AMERICAN INDIANS

William S. Laughlin

A crucial area, likely the crucial area, in which the differentiation of the Eskimo-Aleut stock took place, and in which then contiguous groups of Indians were endowed with similarities and went south, is that of the Kachemak-Kodiak-Umnak-Kuskokwim quadrangle, contained entirely within the Bering Strait to Puget Sound littoral.

The first composite point of overriding significance is the fact that there is physically a greater gap between Eskimo-Aleut and Indians, than between the various groups of Indians or between Eskimo-Aleuts and Chukchi. Racially, the affinities of the Eskimo-Aleut stock are primarily Asiatic rather than New World. There is no question concerning their immediate origin. The degree of immediacy involved, however, is considerably greater than was suspected twenty years ago, and is indicated by the dichotomy between this stock and those of the American Indians. This dichotomy, evidenced in blood groups and morphology, is consonant with the radiocarbon dates, of Agattu, Umnak, and Kachemak Bay, with the evidence of glottochronology, with the sequence of skeletal populations and the sequence of artifactual remains, and with the evidence of population density. The resulting estimates of time depth, some 5,000 years, combined with the additional factor of a southern Bering Sea-North Pacific Ocean focus, enables us to understand many of the similarities that survive in altered form among contemporary but separated peoples who formerly had connections or actual habitation in south Alaska. The dissimilarities and discontinuities are equally edifying.

Among the consequences of the greater time depth now known for the center of this area is the necessity of a considerable change in our thinking. More than merely the contents of our thought should be affected. We are not only thinking of contemporary Eskimos, Aleuts, and Indians, but of proto-Eskimo-Aleuts and proto-Wakashan Indians. Many of the contemporary similarities probably are retentions, in reworked and substantially altered form, dating back to this period of some 4,000 to 6,000 years ago. It is no longer possible to use a little known area, such as interior Canada or Siberia, as a Pandora's box from which we may draw unlimited migrations of pots, people, or harpoon heads to explain the presence of every kind of person and artifact

in each area of interest. The old assumption that evolution took place somewhere else, the somewhere being a spacious and unexplored area (or for which the information was published in a strange language), is no longer tenable.

Affinities, time depth, continuity, and location

We are in the fortunate position of having several diverse kinds of information with which to work. These kinds of materials can be partitioned into (a) those which are primarily useful for indicating affinities; (b) those indicating affinities and time depth, and (c) those which indicate affinities, time depth, and probable center of origin. Thus, linguistic data in itself provides evidence of affinities between languages or dialects, such as the close relationship of Eskimo and Aleut, or the closer relationship of Yupik and Inyupik. It may be used to indicate time depth both relatively, as used earlier by E. Sapir (Mandelbaum, 1949, pp. 457-8), or in more absolute terms, as analyzed by M. Swadesh—4,600 years for the division between Eskimo and Aleut. Finally, the area of greatest linguistic diversity may be used to indicate the probable center of origin, that is southwestern Alaska in the neighborhood of the Aleut-Eskimo border.

A current question is to what extent language may be associated with skeletons or artifacts. In criticizing J. Meldgaard's statement that there was no need to look for Dorset culture parallels or origin in Alaska, Professor L. L. Hammerich remarks, "It seems to be forgotten that the objects found have been made and used by human beings, who have possessed a language. It seems to be taken for granted that the science of language, linguistics, can afford no assistance in determining the origin of these arctic cultures." (Hammerich, 1958, p. 641). Concerning the particular case, "And furthermore, only if it could be *proved* that the Dorset people did *not* speak Eskimo, the linguistic facts of the Eskimo language could rightly be disregarded in determining the origin of the Dorset Eskimo language which mainly preceded, partly was contemporaneous with Thule. . . . On the contrary: even if it is perhaps equally impossible to prove strictly that the Dorset people did speak Eskimo, it is overwhelmingly probable. If not, the language of the Eskimos living now where the Thule people and the Dorset people lived formerly, would be expected to present deep marks of mixture or foreign influence." (p. 641).

Hammerich's remarks accord precisely with those of E. Sapir of 1916 in which Sapir observed that the linguistic diversity of Eskimo and Aleut indicated that the earliest ascertainable center of the tribes of Eskimo stock lay in Alaska. Hammerich remarks in the same vein, and on the basis of more research, "Still stronger than the above named testimony of the WE dialects, this must draw the probable center of origin of the people speaking Eskimo westwards, into the neighbourhood of the Aleuts." (p. 642) and further, "I should not intrude upon the territory of the archaeologist and ethnographer, but I can not refrain from confessing that since some years, in reading papers on the origin of the Eskimo culture, I have been silently wondering if the peculiar conditions of the SW territory of the Eskimos, where they are or have been neighbours of the Aleuts, have attained the consideration they deserve. I am thinking especially of the Iliamna district with the adjoining regions to the S, the W, and the NW." (p. 643).

As a consequence of the researches of the linguists we have some useful estimates, such as 4,600 years for the divergence of Aleut and southwest Greenlandic, and 1,400 years for the divergence of Unaaliq and southwest Greenlandic. If the estimate of 4,600 years turns out to be 6,000 it will not seriously affect the apparent congruence of race, language, and material culture, at least at the present state of analysis. We also have clear and unequivocal evidence of direction of migration from a southwestern center of dispersion, "There is no doubt that the Eskimo now in Russian territory returned to Asia from America" (Voegelin, 1958, p. 57). That the radiocarbon dates for Bering Strait sites should be less than those to the south, for demonstrably Eskimo type cultures, is reasonable and to be expected. The new Okvik date of 1,461 years, in comparison with the earlier date of 2,258 years, is in keeping with the hypothesis of the Kachemak-Kodiak-Umnak-Kuskokwim center of dispersion.

The racial data may now be organized in a similar fashion. Great similarities exist between Alaskan Eskimos and Aleut and Greenlandic Eskimos, with several differences distinguishing the central Arctic Eskimos. Generally speaking the central Eskimos are low in blood type B and high in N. Two explanations for the central Eskimo frequencies have been advanced. Laughlin (1950) suggested that small population size may have contributed and Chown and Lewis (1959) have suggested the presence of a Dorset residuum in the present Eskimos. "It would seem to us not unlikely that the people of these cultures differed genetically, perhaps as much as the Indians of today do from the Eskimo, and that there may well be in the present Eskimo population a Dorset residuum which is genetically recognizable." (Chown and Lewis, 1959, p. 17). These two suggestions are in no way incompatible for an earlier strain is most likely to show through if not amalgamated in much larger populations. Perhaps the most important point here is that the deviation of the central Eskimos is not in the direction of the Indians. "In point of fact so far as the MNSs data go the closer geographically the Eskimo come to the modern Indians the farther they recede from them genetically" (Chown and Lewis, 1959, p. 17). This confirms in well measured detail the argument of Lewis Henry Morgan in 1871 when he presented morphological evidence for the dichotomy between Eskimos and Indians and used cranial measurements as well as his own morphological observations on his three Baffin Island subjects. Morgan found the distinctiveness of the kinship system and the morphology in keeping with a longer period of separation and corroborated Morton's observation that the Eskimos were Asiatic in contrast to American Indians.

New data by M. G. Levin on the blood groups of Siberian Eskimos, Chukchi, and Lamut (Levin, 1958a; 1959a) support the generalization that the Eskimo-Aleut stock has far greater affinities with Asiatic Mongoloids than with American Indians. For time depth we can now take advantage of the generalization formulated by A. E. Mourant and note that the ABH system changes more rapidly, and varies over shorter distances, than the Rh system. The ABH system is relatively stable for periods of 1,000 to 2,000 years or more in most areas. Thus, the fact that among the Indians, importantly contiguous groups such as Tlingit, Athabaskans, and Algonkins do not have blood type B, and that the Chukchi do have type B, is significant in indicating a long period of separation. The fact that Eskimos likely have fewer Rh alleles than Indians indicates even greater time depth. Though comparable data does not yet exist for Siberia

we should bear in mind the absence of the Diego factor among Eskimos and its presence in American Indians, Japanese, and Chinese. Though the frequency of the Diego factor shows a latitudinal cline, and may correlate with temperature, reflecting selection mediated by disease, local differences and gradients would still be useful for a few thousand years of human history.

Other biochemical traits also indicate a dichotomy between Eskimos and Indians. Eskimos have low BAIB excretion rates (β -Amino-isobutyric acid), whereas Alaskan Athabaskan and Apache Indians show similarly high rates (Allison, Blumberg and Gartler, 1959). Eskimos have a low incidence of haptoglobin type 1-1, where Alaskan Indians have an incidence similar to that of Europeans (Blumberg, Allison and Garry, 1959). Eskimos have a high frequency of non-tasters of phenylthiocarbamide, while Indians have low frequencies (Allison and Blumberg, 1959).

In addition to emphasizing the dichotomy between Eskimos and Indians I should like to emphasize the fact that there is no physical evidence of any other race but Mongoloid in the American Arctic and the area down to Kayak Island. Thus the earliest and the latest skeletons alike are Mongoloid, including the Ipiutak skeletons described by G. Debetz and the one Dorset skeleton found by W. E. Taylor (Laughlin and Taylor, 1960). This dichotomy suggests that we might profitably give more attention to retention of traits from much earlier periods and to independent invention in the case of various cultural similarities.

On the other hand, the fact that all the skeletal material so far reported for the Eskimo-Aleut area is Mongoloid should not prejudice against recognizing the possibility of finding non-Eskimo skeletons associated with some of the earliest lithic industries. At the same time interpretations of lithic industries will be qualified until we find who manufactured them. This is especially important for the area south of the known Eskimo-Aleut distribution. The skeletal material from the great Fraser midden should be re-examined with special attention to that from the lower strata. Happily, the frequency of discrete traits is sufficiently diagnostic for Mongoloid groups that fragmentary remains can be employed, and the likelihood of securing useful information in the next few years is good. The finding of indubitable Mongoloid skeletons, not necessarily identical to any of the known variants, would provide the clinching argument for an Eskimoid (proto-Eskimo-Aleut) element in the population history of the area. Another highly informative discovery would be a steep gradient in physical traits between Eskimo and Indian. It is even conceivable that populations extending back to the time when Indians and Mongoloids were differentiating might be discovered.

We do not yet have enough physical data on either morphology or blood groups to use physical diversity in a parallel case to linguistic diversity, though such data should be in hand in a few years. We can note that there has been enough time for evolutionary changes within southwestern Alaska, as seen in the sequence of Paleo-Koniag to Neo-Koniag, and of Paleo-Aleut to Neo-Aleut. The increase in broad-headedness is not confined to southwestern Alaska and appears to be taking place as far away as Angmagssalik (Laughlin, 1958). The same temporal succession derived from stratified village sites can be seen in geographical distribution—the difference between Eskimos at the mouth of the Kuskokwim and those farther up the river, and between eastern and western

Aleuts. There does appear to be an epicenter at Kodiak Island with cranial and cephalic indices decreasing both to the north and to the west. This distribution poses the question, if there has been gene flow or migration west and north from inside the Kachemak-Nunivak-Umnak triangle, why not also to the south?

At least a partial explanation has been offered in the analyses of Drucker, Chard, Okladnikov, and Laughlin. They have in one form or another postulated a ring of populations living on the shores from northern Japan around to the Northwest Coast, with primary adaptations to the sea coast, and whose cultural (and therefore genetic) contacts were primarily with each other along the coasts, and who made varying degrees of adaptation to marine life. Drucker's careful appraisal of the similarities and dissimilarities for the four principal ethnographic areas of the Northwest Coast indicates the principal similarities with the Eskimo-Aleut stock lie in the Wakashan province.

The basic interpretations expressed by Drucker (1955) can be given further substantiation. Aside from specific details these consist in (1) common interest in anatomy and the various concomitants which such an interest entails, (2) interest in technology and mechanical innovation, and (3) a more serious exploiting of the sea, as evidenced in such things as methods of whaling, than their neighbors. More information has been published on anatomical interests, both for the Aleuts (Marsh and Laughlin, 1956) and also for other peoples in the Bering Sea continuum (Laughlin, *In press*). The fact that elaborated anatomical interests appear among the Koryak, Tungus, Chukchi, and Ainu, and not among interior Indians contributes to the concept of a chain of coastal cultures of respectable antiquity. This interest in anatomy is not only manifested in autopsy, mummification, use of the dead, comparative anatomy, and acupuncture, but I think is a recurrent element in art styles where it is manifested in concern for joints appearing early in Dorset art (and such things as mortuary art in the form of inset eyeballs as in Ipiutak and Koniag burials).

The fewer similarities in the Northern Province, as detailed by Drucker (1955), seem in keeping with the possibility that the ancestors of the Wakashan Province responsible for the labrets, harpoon heads, and throwing boards of Borden's Marpole Phase and Locarno Beach-Whalen I Phase, Gulf of Georgia region, were formerly contiguous with the proto-Eskimo-Aleut peoples. The greater antiquity of such traits in the Kachemak-Kodiak-Umnak area as well as their continued use by the Eskimos support the coastal movements thesis of Drucker (1955) and Osborne (1958).

Turning to specific traits described by Borden (1962)¹, the matter of rubbed slate requires two comments. Rubbed or ground slate blades, whether in the form of semilunar knife or lance heads, cannot be regarded as "typical" Eskimo artifacts in a diagnostic sense. Most Eskimos passed the greater part of their history without ground slate blades. The ground slate blade was not instrumental in making any demonstrably better adjustment to their way of life and appears to be simply one more alternate form of cutting edge. In no case does it fit into the diagnostic category with lamps, bolas, and three-pronged bird spears. It may very well have originated in the eastern United States and moved to the west, or the opposite, and have been received by different members of the Eskimo-Aleut stock at different times.

¹All 1962 dates refer to papers in this volume.

The appeal to Lake Baikal is unnecessary and misleading. The Khina ground slate implements referred to by Borden (1962), with a supposed date in the fifth millennium B.C., consist of three unique pointed objects of unknown age. To lay the ghost of the Baikal sequence for having any particular pertinence to coastal cultures of Siberia, much less the New World, I offer the analysis of Chard,

"The remaining diagnostic element in the Khina material consists of the three long (c. 8"), slender, polished slate pointed objects. These are unique in the area, and thus particularly emphasize the isolated status of these two burials. This isolation is assumed to have chronological significance, but one wonders if it could not with equal validity be ascribed to an alien intrusion. . . . The contents of the two burials hence offer no convincing basis for comparative dating despite a superficially Mesolithic appearance. There is no stratigraphic or similar evidence of relative age, and the construction of the graves does not seem to differ from that of the local Neolithic. . . . In short, even if the Khina complex should prove to have a valid existence, it is floating in time in its present form." (Chard, 1958b, pp. 123-4).

In his later paper (1958a, p. 9) Chard notes that, "The two older stages have no such solid basis, and were assigned rather extreme dates by Okladnikov—primarily in an effort to close the gap with the Paleolithic."

Concerning polyhedral cores and lamellar flakes, it would appear that the antiquity of these implements has been pushed back in time and into the interior as evidenced in the findings of W. N. Irving, J. M. Campbell, R. S. MacNeish, and others. Their presence on Anangula Island, and of the blades primarily in the lower two-fifths of the Chaluka site, indicate that they must occur earlier between Umnak Island and Kachemak. Their presence on the Alaska Peninsula is well attested by the polyhedral core found in 1953 (Davis, 1954, pp. 35-6). Their functional relation to knife blades is shown in the percentage variation of these two categories of tools running from the bottom to the top fifth at Chaluka. Knife blades constitute 37 per cent of the chipped stone tools and lamellar graters and scrapers constitute 31 per cent in the bottom of Chaluka. In the uppermost fifth the percentage of knife blades has risen to 70 per cent and that of lamellar tools has declined to 6 per cent (Laughlin and Marsh, 1956, p. 10). Under-reporting is certainly in evidence and the possibility at least exists that such industries, or subdivisions thereof, may have an American origin which antedates the rise of the Eskimo-Aleut cultures as such.

The most reasonable explanation for the origin of coastal cultures remains that of older and contiguous coastal cultures. Matriculation on a river is not a prerequisite for life on the seashore, much less life on the open sea. Within the chain of coastal cultures extending from Japan around to the Northwest Coast and including California are examples of riverine cultures that never became maritime, of maritime cultures that were never riverine, and no accepted example of a riverine culture that has become maritime. The only indigenous maritime culture in Japan, during late Jomon time, developed in a region where there are no rivers. The Chumash of the Santa Barbara region is a similar case. The Amur has been occupied by people since Neolithic times and none have moved out to become coastal or maritime. The studies of Osborne make it clear that we cannot generalize yet on any tendency to move down rivers. The over-all example provided by the spread of the Eskimos is clearly in favor of coastwise movements. It should also be noted that coastal adaptation, strandloping, does not impel people to take to the sea. The Kamchadals are

classic examples of people who made a good living on anadromous fish but considered a trip on the sea a risky adventure, much as the California Indians (Yurok), and did not succeed even in getting to the Kommandorski Islands, a nearby area of unusual mammalian riches.

Population density, ecology, and time depth

Better evidence is now available concerning the geographical distribution, numbers, and time depth of sea mammals (McLaren, 1958; Scheffer, 1958; and Fay, 1957). The significance of the faunal evidence lies not only in its relation to the distribution and the technology of the aborigines, but includes its relation to population density, to time depth, to the establishment of centers of cultural climax and diffusion, and to the genetic history of the dependent populations. In the past we have been concerned with how the people made a living to the exclusion of the consequences of how well that living was made.

Four facts of primary importance emerge: (1) the comparatively larger numbers of sea and land mammals, birds and fish, shellfish and plant foods, available to inhabitants of the Kachemak-Umnak-Nunivak area, (2) the kinds of species available, referring not only to where they were, land or sea, but to how many months of the year they were accessible, (3) the fact that complex coastlines are richer, and more suitable for most kinds of hunting than simpler coastlines, and (4) the evidence that such distributions have been available for several thousands of years. Since the first three points have received attention only the last will be treated.

How early were various animals available and did physiographic conditions permit their exploitation? The existing evidence suggests that we can consider the faunal supply relatively constant for the last 5,000 years and also the basic features of coastline. Areas local to particular village sites can be documented from bones found in the sites, recognizing that errors will lie in whether or not the inhabitants were equipped by virtue of technology and interest to exploit them. Bones of all current sea mammals, whales, seals, sea otters, and sea lions, are found in the bottom fifth at Chaluka and give clear evidence that the people were using them. There is, however, no way to distinguish between death from natural causes and death resulting from use of a sharp instrument. The connection between weapon types and animal skeletons remains one of the most important, yet often tenuous inferences in archaeology. Occupation of Umnak Island is adequate proof of boats. That they were used for hunting at sea is quite likely but does not enjoy the same level of proof.

In his discussion of the evolution of pinnipeds Scheffer (1958, p. 33) has remarked:

"One supposes, in short, that the Otariidae date more recently from the Southern Hemisphere than from the Northern. (It is perhaps more than coincidence that the sea otter, representing an experiment in the adjustment of a carnivore to marine life, inhabits only the North Pacific. Did the protected, food-rich, kelp reefs of the North Pacific serve as a launching platform for both otariid and sea otter stocks?)"

The geological picture has not changed greatly in the last 5,000 years, unlike that of the central Arctic, and we may assume that the entire inventory of animals from whales and sea otters to annual runs of salmon and cliff-nesting birds were available for exploiting in southern Alaska. Hopkins, in his recent

discussion of the Cenozoic history of the Bering Land Bridge (1959, p. 1,524), suggests that a rapid rise in sea level began again some 7,000 years ago, and that the sea level has lain within 10 feet of its present position throughout the last 5,000 years.

In exemplification of the peculiar conditions I should like to offer three emendations to misleading statements concerning walrus, caribou, and driftwood in this area. Larsen and Rainey have remarked that caribou never lived on the Aleutians (1948, p. 156). Caribou lived, and still live, on Unimak Island and other islands such as Deer Island. A useful summary is found in Murie, (1959, pp. 329-31). "In primitive times, it is evident that caribou were more plentiful on Alaska Peninsula and Unimak Island and 'overflowed' to other islands, possibly to more islands than is shown by these meager records" (Murie, 1959, p. 329). There was much caribou hunting by visiting sea otter hunters as well as by the regular inhabitants. Whale and caribou sinew were favored by Umnak Aleuts for sewing boots as recently as 1952. The Eskimos and Aleuts of southern Alaska have had access to caribou, and other land animals without recourse to a caribou hunting phase or stage as such in their culture history.

The distribution of walrus is similarly minimized. Larsen and Rainey remark that, "To the south, it is rarely encountered south of the Pribilof Islands." (Larsen and Rainey, 1948, p. 157). In fact, the north side of the Alaska Peninsula and Unimak Island have been long used by resident Eskimos and Aleuts and by Aleuts who travelled there especially for walrus hunting. Great numbers are known to have been killed at Port Moller, and Wetmore reported a few walrus still to be found on Walrus Island near the west end of the Alaska Peninsula in 1911. The Aleut name for Walrus Island, which was correctly translated into Russian and then into English, is Amak. Amak is the older Aleut word for walrus, the current word being Amgadakh. Again, a summary of the walrus distribution is found in Murie (1959, pp. 311-14). Pilot Zaikov describes walrus near the Alaska Peninsula, about 1778, and he secured 335 pounds of walrus teeth (Masterson and Brower, 1948, p. 92).

In her splendid study, 'Chugach prehistory', de Laguna includes the puzzling statement, "The Aleut, who had no wood but that cast up by the sea or obtained in trade, produced relatively few woodworking tools, but the Chugach in contrast had a richer assortment than any other southwestern Alaskan people" (de Laguna, 1956, p. 263). The Aleuts had much driftwood. The combination of complex coastlines and favorable currents brought wood from both Asia and the New World coasts. They used planking for their houses, in the mummy caves, and long pieces prominently in frames for kayaks and umiaks, as well as shorter pieces for a variety of dishes, household utensils, and weapons. Not only was the supply good, much of it was seasoned and free of bark. They could afford to select special kinds of wood for special purposes and they have names for all these woods. The people at Chaluka had ready access to an especially good place, "Driftwood Bay". Tools of the heavy woodworking industry are found in the lowest levels at Chaluka and continue to the top. Whalebone splitting wedges are perhaps the most common tool in all the Aleutians. The Aleuts also cooked large sections of sea lion in outdoor pits, using wood for fuel. The Chugach had more kinds of woodworking tools, at least in their later history. Large amounts of driftwood

were reported for Umnak and Unalaska as early as 1763 by Ivan Korovin (Coxe, 1780, p. 103).

Only the polar bear and muskox are missing from the inventory of animals in the general region of the Alaska Peninsula. The population density and cultural complexity faithfully reflect the ecological wealth of this area. Particular local areas must of course be excepted. In our study of the Katmai region on the Alaska Peninsula, W. Davis, J. Leach, and I were struck with the lack of deep stratified sites comparable with those of Kodiak, Unalaska, or Umnak, though there was ample evidence of antiquity and of stratification (Davis, 1954). The Chignik area again shows nothing comparable. Port Moller, however, does conform more to the picture of high population density as the researches of S. Sugihara and C. S. Chard for the summer of 1960 have enlarged the picture of E. B. Weyer. De Laguna (1956) has found that the population about Prince William Sound was curiously small in relation to its abundant food resources. The Sitkalidak-Three Saints Bay area appears to have supported several large villages in addition to many smaller summer encampments. How far back the population estimates based upon figures for the more recent periods of occupation and the contact period can be extended has not yet been examined. Such a question is obviously crucial for the North Pacific coast which appears to have had a relatively recent florescence. Perhaps the most important point here is that early peoples in south Alaska (5-6,000 years ago) could have made a good living on the coasts and made use of caribou and other land animals, without abandoning the coast for their major occupation, and without boats. The invention of the kayak, in southern Alaska, enabled much more extensive exploiting of the marine resources but the original occupation of Bristol Bay, the Alaska Peninsula, and contiguous areas, did not depend upon boats. It is plausible, therefore, to expect both people and traits to have moved south from Alaska down the coast and to have done this at an early period. In this respect it is of interest that the Koniags, as well as the Chugach, knelt in their kayaks and used single-bladed paddles, whereas the Aleuts sat in their kayaks with legs extended as do all other Eskimos. Whether this represents an older or younger trait may not be amenable to testing, but it does represent an intergradation in use between the dugout boats and the skin-covered boats.

It is possible that natural conditions have played an important role in differentiating between various Eskimo groups as well as between Aleuts and Eskimos. Winter ice is reported for three months of the year, December through February, at Port Moller. This is relevant to the distribution of walrus and to the methods of hunting seal. The south edge of the Bering-Chukchi platform meets approximately the western end of Unimak Island, however, the sixty-foot contour which nearly encircles Nunivak Island, runs very close to the north side of the Alaska Peninsula. This has relevance for the distribution of whales, important to the Aleutian Islanders and to Koniags, but unavailable to the peoples in Bristol Bay and Nunivak Island. The traditional line separating Eskimo from Aleut, running from Port Moller to Kupreanoff Point, may have much time depth even though it may have wandered for two hundred or more miles on either side of its present position. It is worth remarking that the presence or absence of whale hunting did, of course, provide a more abundant life for those who could use whales. It is equally important that it reflected

several other correlative features of the environment and of the technology. The old discussion about the significance of whaling in bringing a more abundant rather than a different kind of life is too simply phrased. If the people can secure as much or more food by focusing on fish, seal, birds, walrus, and caribou, then the absence of whales constitutes no deprivation. If whales can be killed, or more precisely, taken with the same implements used for seal and walrus, then there is no difference in kind of culture depending only on whaling. Owing to their seasonal appearance, numbers and difficulties in preservation, there is no group of Eskimos that has depended solely or even primarily upon whales. Recognizing the importance of the kelp reefs and of cliff birds in southern Alaska, it is tempting for poetic reasons to construct a kelp and cliff culture. It would, however, be as much of an exaggeration as stereotyping the cultures as whaling even though whaling appears to have been important from earliest times. What people eat usually reads like a biological inventory of the area they inhabit. They must eat twelve months of the year and at intervals not exceeding a few days. Major differences in the fauna and in their accessibility must be reflected in the culture. But, the major differences are rarely, if ever in the occurrence of a single animal without correlative occurrences and without differences in physiographic conditions to which the people must adapt.

Identification of artifacts

One of the interesting differences between Eskimos and Indians is the preference of Indians for scratching their heads, and of the Eskimos for scratching their backs. Both these traits have substantial archaeological evidence, as well as ethnological documentation. I should like to suggest that back-scratchers are part of the Ipiutak culture and are depicted in Pls. 73 and 74 of the Ipiutak report (Larsen and Rainey, 1948). Back-scratchers are known from the Aleutian Islands and all the Eskimo area including Greenland. The Aleutian back-scratcher is also represented by a diminutive form used by pubescent girls. Various examples may be found in E. W. Nelson (1899, p. 310, Fig. 98) who reproduces one from Sledge Island and in Porsild (1915, p. 230, Fig. 63) who reproduces one from northwest Greenland. The Aleutian form, based on my specimen from Amchitka, is like that from Greenland. Larsen and Rainey (1948, Pl. 73, 1) remark on one specimen in particular which was carved in the form of a human hand at one end, and had been thrust through the neural canal of some cervical and possibly one dorsal vertebrae of a partially articulated human skeleton. Another (Larsen and Rainey, 1948, Pl. 73, 6), had a hand or flipper carved at one end. It is difficult to imagine in what way these could approximate a back-scratcher more accurately than they do. Since back-scratchers are known from the Aleutians to Greenland some considerable time depth may be inferred. That they are a well-known feature in Chinese culture establishes an Asiatic link and indicates again, more time depth. It seems unnecessary to invoke a Lapp bear ceremonial to explain a common Eskimo-Aleut trait.

A detailed study of Eskimo back-scratchers and louse rakes might permit additional identifications. Porsild (1915) speaks of the back-scratcher or louse rake and louse-trap. Those Ipiutak rods with a slot at each end (Larsen and Rainey, 1948, Pl. 73, 5-6) seem well suited for insertion of a piece of fur (bear skin).

Similarities between chipped stone artifacts of the Aleutians and those of more northern industries, including Dorset, have been commented on many times. The long chipped blades of Cape Krusenstern described by J. L. Giddings (1962) are a case in point. Side-notched points are also known from the Aleutians but not in sufficient quantity to characterize a period or place. Less attention has been given to similarities in bone and ivory harpoon heads. It is thus of considerable interest to see the remarkable similarity between the pieces illustrated in Fig. 1. The smaller of the two is derived from the Choris culture,

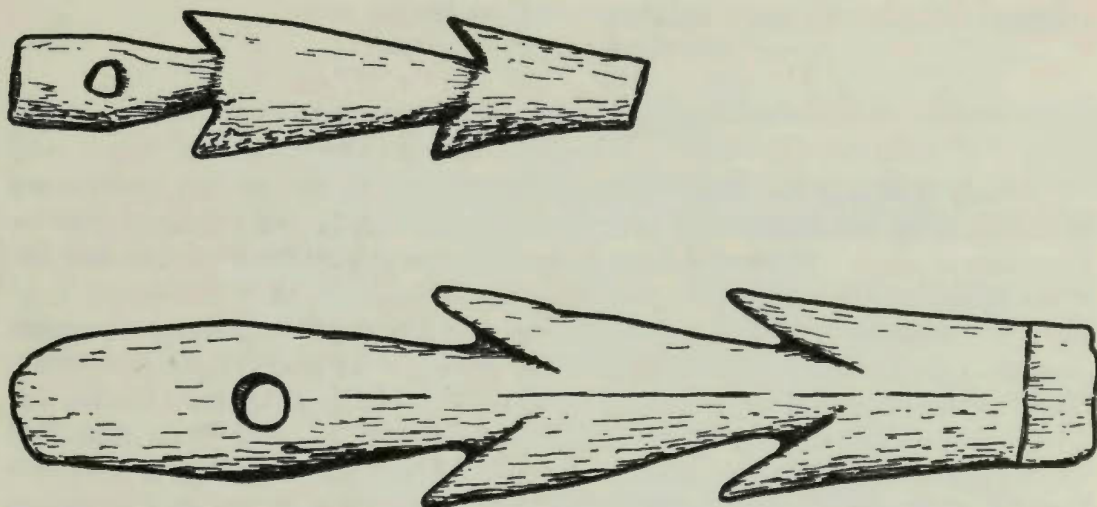


Fig. 1. Smaller specimen: "Dart head", Choris culture. Chipped end point found in place, not shown here. $3\frac{1}{4}$ in. long. (Giddings, 1960b, p. 16). Larger specimen: "Harpoon head", Chaluka, Umnak Island. Chipped end points characteristic of this period found nearby, not shown. $5\frac{1}{2}$ in. long. (Laughlin and Marsh, 1951, p. 84).

the larger from Chaluka (Umnak Island) in the fourth fifth from the top. The points of similarity consist of the broad butt, round line-hole, two parallel barbs, and an end slot for insertion of a straight-based chipped stone point. The dissimilarities consist of a size difference, decoration (the Aleutian specimen having a circle and dot design on the obverse), and the material of the end points, quartzite for the Choris specimen and andesite for the Chaluka, and material of the head, probably antler for the Choris specimen and whalebone for the Chaluka specimen.

Laughlin and Marsh have previously published distributional data on the occurrence of square butt, tanged points and end slotted spear and harpoon heads noting that these characterize the lower deposits at Chaluka (1956, pp. 6-7, Pl. 1). We placed the Chaluka specimen (Fig. 1) in the category of harpoon head rather than spear owing to the large butt and to its size. We also surmised that this style (H-4) is one of the kinds used for whaling. The drawings reproduced here are based on photographs, Pl. 48 of the 'Chaluka prehistory' (unpublished manuscript), and the photograph of the Choris specimen appearing in the upper left corner of artifacts from the Choris Peninsula (Giddings, 1960b, p. 16). This latter photograph shows the chipped quartzite point in place; the artist has removed it in the accompanying figure.

The Chaluka specimen is one of a class of which eight specimens, not identical, are found in the bottom fifth, four in the fourth fifth, four in the third fifth, one in the second fifth, and none in the most recent fifth. Using the C-14 date this particular specimen is in the 3,000-year level.¹ The lower ones are presumably older.

The use of these specimens is likely different. Giddings remarks, "These people show no signs of having practiced whaling at Choris Peninsula" (Giddings, personal communication, 15 November 1960). While we do not have standard procedures for establishing degrees of similarities, this one appears sufficiently well founded in generic elements to be of use in our study of relations between the early inhabitants of the Bering coast.

Distances and dates

Much attention has been given to the dates for sites running from south to north, using Kachemak Bay as a turning point, but less to the dates running from east to west. Using Anchorage as a point of departure Port Clarence lies 1,399 miles, and Point Hope 1,564 miles to the north. Attu (Massacre Bay) lies 1,521 miles to the west, and the Columbia River 1,418 miles to the south. Assuming the C-14 dates are approximately accurate, we have a coherent picture based on Kachemak Bay, Period I of 750 B.C., Chaluka, Umnak Island, one meter above floor of 1,000 B.C., and Aggatu Island, Krugloi Point, 630 B.C. (A. C. Spaulding, personal communication). These numbers have been intentionally rounded in order to prevent any idea of spurious accuracy. Employing the indissoluble fact that the Eskimo-Aleut stock did not originate on Umnak Island, older dates must necessarily exist to the east, the direction from which the people moved. The rough concordance in dates over this long distance, and with cultures bearing marked resemblance to each other, suggests that the magnitude of our error is not great.

There are apparently two different factors affecting the dating of clam shells and of peat. G. H. Marsh in a paper presented at the 1953 meeting of Northwest anthropologists, Pullman, Washington ("A radiocarbon dating problem from the central Aleutians", unpublished manuscript) examined the Lamont natural radiocarbon measurements for specimens of clam shells and peat from Clam Lagoon, Adak Island. The modern clam shells had been dated at 1,900 years, excavated clam shells at 4,580 years, and buried peat, several feet below the midden clam shells, 1,200 years younger. Although these dates can be made to fit rather easily—by subtracting the age of the modern shells, which then places the midden shells in suitable chronological order to the peat to correspond with the stratigraphic order—it would seem better, as Marsh suggests, to await more dating in this area.

¹The following dates were obtained from Chaluka excavations of 1961:

<i>Isotopes Inc. No.</i>	<i>Depth in midden</i>	<i>Age in years B.P.</i>
I-494	150 cm. below surface	2,875 ± 160
I-495	275 cm. below surface	3,600 ± 180
I-493	300 cm. below surface (near bottom)	3,750 ± 180

Using the linear extrapolation of the geologist, Dr. R. F. Black, the bottom should be near 4,100 years.

The Locarno Beach Phase of the Fraser delta region, with "Eskimoid" traits, dated as early as 500 B.C., still is lacking critical traits such as three-pronged bird spears and lamps. Labrets, which have little to do with a way of making a living, are of special interest. Their earlier occurrence in Alaska does tend to confirm Drucker's hypothesis. Assuming that in no one of these places do we yet have the earliest dates, and that the proto-Eskimo-Aleut culture was fairly well developed as a prerequisite for its bearers to reach Umnak Island well prior to 1000 B.C., it seems trivially obvious that older occupations exist in the Kachemak-Kodiak-Kuskokwim-Umnak quadrangle.

Summary and conclusions

1. The dichotomy between Eskimos and Indians is sufficient to suggest much time depth for the period of their separation. From this we may infer more importance for retentions from an earlier period of contiguity and cultural exchange, and for independent inventions based on common ecological problems and cultural background.
2. The present relatively sharp dichotomy may not apply equally to the crucial period of 4,000 to 6,000 years ago. The possible contiguity of proto-Eskimo-Aleut and proto-Wakashan peoples deserves consideration.
3. Faunal and physiographic features of the Alaska Peninsula, including marine areas, may contribute to the explanation of the separation of Aleut and Eskimo.
4. The Mongoloids, moving clockwise about the Bering Sea, passed Kamchatka before the invention of the kayak. Invention of the kayak took place in southern Alaska, prior to the separation of Aleuts and Eskimos.
5. Linguistic, biological, and archaeological evidence suggest the origin and early residence of the proto-Eskimo-Aleut stock, with recognizable Eskimo culture, in southern Alaska, within the Kachemak-Kodiak-Umnak-Kuskokwim quadrangle, and the separation of these people in the same area.
6. The consequences of population size, density, and composition require attention, as well as the ecological and physiographic bases.
7. The most obvious origin of coastal cultures lies in antecedent coastal cultures.
8. A future review of connections for the Bering Strait to Puget Sound area will be considerably facilitated if archaeologists find richer and more informative stratified permanent winter village sites, richer in stone, bone, wood, and ivory artifacts, and especially in that most elegant and edifying of all artifacts, the human skeleton.

BERING STRAIT TO GREENLAND

Henry B. Collins

In the following account I will consider for the most part the Eskimo area proper and the bearing that the new discoveries presented at this symposium, and other recent developments, may have on the basic problem of the origin and relationships of Eskimo culture. For this purpose it will not be necessary to attempt evaluation of the oldest finds that have been made in the Arctic—those which are not only thousands of years older than any known form of Eskimo culture but which also, from present indications, have no demonstrable connection with Eskimo. There seems no reason to question the prevalent view—dictated by radiocarbon dating—that these earliest pre-Eskimo materials indicate culture connections of some kind with Paleo-Indian complexes to the south, and that the direction of movement, or diffusion, has been from south to north. Harp (1962¹) has presented a plausible explanation of the manner in which this may have come about.

I shall restrict attention as far as possible to the somewhat later manifestations, the series of microlithic assemblages included in what Irving (1962 and in literature) has aptly called the Arctic Small-Tool tradition. This too is pre-Eskimo, but with the important difference that the prefix in this case has the connotation of “predisposed” or “leading up to”. According to this interpretation the microlithic Arctic Small-Tool tradition, though much older than any known Eskimo culture, was the primary source from which was derived another microlithic arctic complex—the Dorset—which, prior to the arrival of the Alaska-derived Thule culture about 800 years ago, had existed for some 2,000 years as the basic, autochthonous form of Eskimo culture throughout eastern Canada and Greenland. The first inkling of this came with Giddings’s discovery of the Denbigh Flint complex—charter member of the Arctic Small-Tool tradition. At that time, and up to 1954, our knowledge of Dorset was limited to what is now recognized as the classic, fully developed form of the culture, as first described by Jenness (1925) from Hudson Strait, and as known from later finds on Southampton and Bylot islands (Mathiassen, 1927), Newfoundland (Wintemberg, 1939; 1940; Harp, 1951), Melville Peninsula (Rowley, 1940), Ungava (Leechman, 1943), northwest Greenland (Holtved, 1944), Frobisher Bay (Collins, 1950), and Mill Island (O’Bryan, 1953). Even then, there was good reason to believe that the pre-Eskimo Denbigh Flint complex, with definite Old World Mesolithic affinities, had contributed significantly to the formation of Eskimo culture, particularly Dorset, and in part Ipiutak (Giddings, 1951; Collins, 1951a; 1953a, b; 1954a, b; Harp, 1953). Excavations in

¹All 1962 dates refer to papers in this volume.

1954 and 1955 at the early Dorset site T 1 on Southampton Island provided additional and more conclusive evidence of a linkage between the Arctic Small-Tool tradition and Dorset (Collins, 1956a, b; 1957a, b). This site, with four radiocarbon dates ranging from 675 to 60 B.C., yielded a large body of material—several thousand artifacts of stone, ivory, and bone—which represented a different and older form of Dorset culture than any known from previous excavations in Canada or Greenland. Specific resemblances and differences between T 1 and other Dorset sites have been recorded and need not be repeated here. T 1 types that were comparable to those of the Arctic Small-Tool tradition were microblades, oval and rectangular side blades, burins, and burin spall implements. There were also parallels with early Neolithic cultures of Siberia and Mongolia: microblades, long rectangular bifacial and unifacial side blades, small delicately chipped triangular end blades, and triangular-sectioned spall implements struck from the outer edges of prepared cores. In short, the most important and diagnostic implements of the Arctic Small-Tool tradition and several other forms characteristic of the early Siberian and Mongolian Neolithic were equally diagnostic of this early Dorset culture site on Southampton Island.

Meldgaard (1955; 1960a, b), who excavated a series of Dorset and pre-Dorset sites in the Igloolik area in 1954 and 1957, does not concur in this view. One of his sites, or periods (Dorset II), the second oldest of five stages of Dorset culture represented at the Alarnerk and other sites, appears to be identical in age and content with the T 1 site on Southampton Island. However, the Dorset series as a whole, including the undescribed Dorset I, is considered to stand rather sharply apart from two preceding stages of Sarqaq culture (representative of the Arctic Small-Tool tradition) found at higher elevations in the same locality. Meldgaard believes Dorset to be essentially a new form of culture which reached the Canadian Arctic by diffusion or, more likely, which was brought there by new people who moved into the area from the south; the region between the Great Lakes, James Bay, and Newfoundland is thought to have been the region in which the ancestors of the Dorset people developed their peculiar form of culture.

We are indebted to Meldgaard (1962) for correctly identifying the curious little triangular blades which are so common at T 1 and which for want of a better name I have called "triangular microliths". These are indeed "sharpening flakes", produced in just the manner described by Meldgaard, and not intentional artifacts, even if some of them have subsequently been worked slightly and used as tools. Whether their presence in Newfoundland indicates a south to north movement will depend on the age of the Newfoundland Dorset in relation to T 1 and Igloolik Dorset.

The Igloolik sequence seems to be one of prime importance for eastern Eskimo archaeology, but faced with the present dearth of information there is no basis for assessing its significance. Only a few selected artifacts have been described and illustrated, there is no inventory for any of the five Dorset and two Sarqaq stages, and no specific information as to how the two Sarqaq stages differ from one another or from Dorset I, the most crucial stage of the series. We need in particular a precise definition of Dorset I. It is not stated whether the early Dorset artifacts illustrated in Meldgaard's Pls. 2 and 3 (1962) for comparison with Sarqaq are Dorset I or II. Apparently most of them are

Dorset II, for with the exception of the slate blades and the snow knife, they are types characteristic of the T 1 site on Southampton Island.

The Sarqaq implements illustrated by Meldgaard at the left in Pls. 2 and 3 raise the question as to why this Igloolik material is called by that name. As the Sarqaq sites at Disko Bay, Greenland, contained no organic materials, the bone artifacts from the Igloolik area could be identified as Sarqaq only if the accompanying stone implements were unequivocally of that culture. However, I can see little resemblance between the stone implements shown at the left in Pl. 2 and those that have been described from Greenland Sarqaq sites (Meldgaard, 1952; Larsen and Meldgaard, 1958; Mathiassen, 1958). The burins are not at all like the delicate, highly standardized rubbed burins of Disko Bay. The asymmetric blades, the expanded-edge end scraper, and the microblades are types that do not occur in Disko Bay Sarqaq. All of them, however, as well as the burins and small oval side blade, occur as typical forms in Dorset. On the whole, it seems to me that these Igloolik implements are much closer to Dorset, and mainly late Dorset, than to Greenland Sarqaq. As Taylor has remarked (1962), Greenland Sarqaq is a very late member of the pre-Dorset continuum. It is also a highly specialized and localized culture. As most of the Greenland Sarqaq types are specifically different from those occurring at pre-Dorset sites in the Canadian Arctic there seems no reason to extend the term Sarqaq to the latter. It would be better to refer to the various pre-Dorset manifestations in Canada by the name of the locality at which they were found, as for example Taylor (1962) does when he speaks of the Ivugivik complex of the pre-Dorset continuum.

As for the Sarqaq bone artifacts, the lance head shown in Meldgaard's Pl. 3 (1962) is an exact duplicate of the early Dorset lance heads from T 1. On the other hand the harpoon head with single asymmetrically placed basal spur and oblique lateral line hole is suggestive of a type which occurs frequently at what have been regarded as late Dorset sites, but which is conspicuously absent at T 1. An open-socket, barbed harpoon head from the Sarqaq level at the Parry Hill site, illustrated in another paper (Meldgaard, 1960b, p. 74, II, upper left) is more suggestive of Birnirk-Thule than Dorset. These artifacts might appear less puzzling if we knew more about the circumstances in which they were found, for example if they came from one house or several houses, if they are single finds or representative types, and in the case of the Jens Munk site, whether they were found in direct association with the stone implements shown in Pl. 2 (Meldgaard, 1962).

Perhaps a word of caution may be in order here on dating archaeological sites solely by their elevation above sea level. The method is extremely useful and generally valid when no complicating factors are involved. Thus, Taylor's (1962) estimate of the relative ages of the pre-Dorset Ivugivik complex, at elevations of 105 to 139 feet, and of later Dorset sites at 39 to 69 feet, on raised beaches containing *only* those materials, provides a dependable guide to the chronology of northern Ungava and neighboring regions. Eskimos of two or three thousand years ago could not have occupied a low-lying beach ridge which was formed only a few hundred years ago. But Eskimos of later times can, if they choose, settle on older, higher beaches, and one beach ridge *can* contain sites of different ages. The situation at Resolute Bay, Cornwallis Island, is instructive in this regard; there we found sites and materials of

different age on the same beach, and sites and materials of the same age on both younger and older beaches (Collins, 1951b; 1952; 1955). On the 8th and 9th beach ridges, at a maximum elevation of 64 feet and 280 yards back from the present shore, was the large M 1 site which showed three occupations—Dorset, early Thule, and late Thule. On the 2nd beach ridge, the first above the present beach, was the M 2 site at an elevation of 20 feet; there late Thule houses and middens overlaid a well-defined Dorset level. A large collection of late Thule artifacts was excavated at both M 1 and M 2. The artifacts are identical and the sites were undoubtedly contemporaneous, probably the winter and summer dwellings, respectively, of the same people. M 2, near the shore, would have been occupied during the season of open water so that boats could be launched quickly. If, as seems probable, M 1 was the winter village, there was no need for it to be near the sea, as the sea was frozen, and dog teams, rather than boats, would have been used for hunting and traveling. The 64-foot elevation might have been chosen because it provided a better lookout for seals far out on the sea ice.

Though recent finds in the Canadian Arctic have made it increasingly clear that the Dorset Eskimo culture was primarily an outgrowth of the Arctic Small-Tool tradition, there are also indications that Indian cultures to the south, probably the Old Copper and other Archaic manifestations, contributed in a secondary manner to its formation. Two small pieces of copper found at the Abverdjar site near Igloolik (Rowley, 1940) and another, a small piece of copper wire, from the Dorset level at the M 1 site on Cornwallis Island, might be explained as actual imports from the Great Lakes region. The Old Copper or some other northern Archaic culture in all likelihood was the source from which the multiple side-notched blades of early Dorset were derived. We might even consider the possibility of a relationship between the simple decoration of short straight lines which occasionally occurs on Old Copper artifacts and the somewhat similar designs of Dorset art.

The Dorset asymmetric knife and closely related spokeshave (Pl. 1, *a-b*) are worthy of special mention as indicative of crossties between Dorset and Archaic. These implements are highly characteristic of late Dorset culture, but not of early Dorset, being absent at T 1. Having assumed that these specialized implements were uniquely Dorset, I was surprised some time ago to find that Thomas Wilson (1899, Pl. 39, 16, 17) had illustrated two chipped stone artifacts from Georgia which were strikingly similar to those found at Dorset sites. They are reproduced here (Pl. 1, *i, k*) together with 13 others (Pl. 1, *j, l-w*) from a total of 45 similar implements in the United States National Museum from the same site. As the type has not been recognized as one belonging to the southeastern Archaic, a brief description may be in order. They are all surface finds, collected in the 1890's by Dr. Robert Steiner at an old Indian village site on the Davis Plantation on the east side of Buckhead Creek, twelve miles southwest of Waynesboro, Burke County, Georgia. From an unpublished manuscript by Thomas Wilson describing the Steiner collection from this site it is seen that the other implements found there were types now recognized as Archaic. In June 1959 I visited the site and collected enough material to show that it was undoubtedly Archaic. The material from which the asymmetric knives or scrapers and most of the other implements were made is a light tan, mottled olive, or bluish flint. As is general with Archaic flints

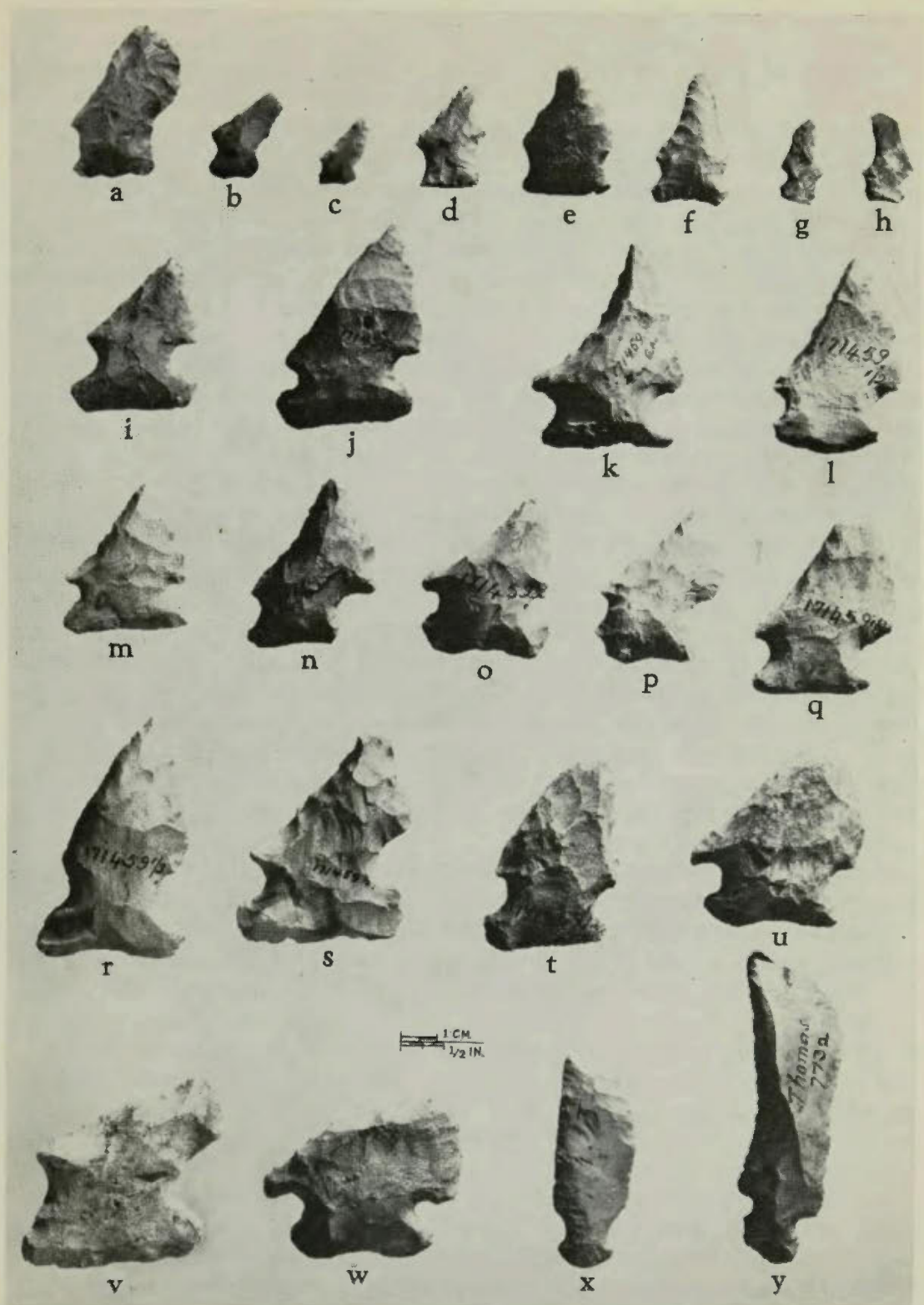
from this region, the implements are deeply patinated, with a surface color ranging from almost white to creamy yellow. The great majority of the asymmetric blades are unifacial, like the comparable Dorset examples, with no trace of chipping on the opposite side. The steeply chipped working edge is similar to that on the well-known beveled blades from the area, but even steeper, sometimes forming almost a right angle. The oblique angle and steepness of the edge is more suggestive of a scraper than a knife. Forty-three of the 45 specimens have the working edge at the left, indicating right-handedness.

The Dorset implements used here for comparison—the only ones I happened to have available—are from the Crystal II site at Frobisher Bay (Pl. 1, *a, b, d-h*) and the T 2 site at Native Point, Southampton Island (Pl. 1, *c*). There are a number of others in the National Museum of Canada, and some published examples, that show a closer resemblance to the Georgia implements. The principal difference between the Dorset and Georgia implements is that the latter are larger, have deeper side notches and a more acutely beveled cutting edge. On Plate 1, *x*, a narrow tanged curvate knife from the Frobisher Bay site is shown for comparison with one of similar form from Georgia (Pl. 1, *y*).

It is probably accidental that the asymmetric knife or scraper has not been found at other Archaic sites in the Georgia region. Webb has described asymmetric implements of the spokeshave variety similar to Plate 1, *g, h*, from northwestern Louisiana, as a diagnostic trait of the Albany focus of the Archaic (Webb, 1946). Similar blades were found by Mulloy (1952) in the Pictograph Cave, Montana, and Ritchie (1962, Pl. 1, *n*) illustrates an asymmetric blade from the New York Laurentian which shows some resemblance to Dorset. Also, one of the short, side-notched blades from Giddings's Palisades site at Cape Krusenstern has an oblique, steeply chipped cutting or scraping edge like those on the Georgia implements. On an earlier time level, we might mention the Cody knife found at Paleo-Indian sites in the western United States and Canada (Wormington, 1957, Fig. 41), though in this instance the oblique-angled cutting edge is the only feature in any way suggestive of the Dorset and southeastern implements.

The parallels I have mentioned suggest that a limited number of Dorset traits were derived from Archaic. From all indications, however, the cultural influences thus exerted on Dorset were secondary; the primary source of the Dorset culture was the pre-Dorset of the eastern Canadian Arctic, which in turn was related to earlier manifestations of the Arctic Small-Tool tradition in Alaska and Siberia.

If the contacts between Dorset and Archaic were more intimate and more basic than I have assumed, then movements of people might have been involved; if so, the Dorset people might be considered either as those who had intruded into the Canadian Arctic from the south—which would mean that they were Indians—or, that they were the result of direct, close contacts involving racial mixture between pre-Dorset and Indian. Either supposition would gain in probability if it could be shown that the Dorset Eskimos were significantly different from other Eskimos physically, and in particular if there were physical resemblances between them and neighboring Indians to the south. Until very



PL. 1. Asymmetric knives or scrapers from Dorset culture sites at Frobisher Bay, Baffin Island (*a, b, d-h, x*); Native Point, Southampton Island (*c*); and from the Georgia Archaic (*i-w, y*).

recently there has been no information whatever as to the physical type of the Dorset people. Particular importance therefore attaches to a male skeleton from Payne Bay, northern Ungava, collected in 1957 by Taylor and identified as Dorset (Laughlin and Taylor, 1960).

We may consider briefly the question of whether the Payne Bay skeleton exhibits Indian characteristics or whether it is typically Eskimo; and if it is Eskimo, whether on the basis of the archaeological evidence it can be identified as Dorset. Pertinent to such an inquiry is the fact that the highly specialized eastern Eskimo cranial type in the totality of its features stands sharply apart from that of any Indian group. This is shown by morphological and metrical features such as the contour of the vault, size and shape of the face, breadth of face in relation to skull, size and shape of the nasal bones and nasal aperture, size and slope of the malars, form of the orbits, size and shape of the mandible, thickness of the tympanic plate, and the presence of bony swellings of the lower and upper jaws and palate known respectively as mandibular, maxillary, and palatine tori (Collins, 1951a). It can be said at once, in agreement with Laughlin (Laughlin and Taylor, 1960) and Oschinsky (1960), that the Payne Bay skeleton is that of an Eskimo. The morphological features mentioned above, and others described by Laughlin, are characteristically Eskimo, and the same is true of the metrical features, with two exceptions: these are the height of the orbits and the breadth of the nasal aperture. The mean orbital height of 34.5 mm., though well within the Eskimo range, is considerably lower than the Eskimo average. The nasal breadth of 26.0 mm. is much greater than the Eskimo average, especially eastern Eskimo, and almost exceeds the Eskimo range. In these two features—low orbits and wide nose—the Payne Bay skull is actually closer to the northeastern Indian type than to Eskimo. However, in view of the fact that the other measurements are typically Eskimo and that the skull exhibits that cluster of morphological features so characteristic of Eskimo, but not of Indian, there can be no doubt that Laughlin and Oschinsky are correct in identifying it as Eskimo. It might also be noted that the most un-Eskimo feature of the skull—its very wide nasal aperture—is counterbalanced by the nasal bones themselves, which may be described as hyper-Eskimo. The Eskimos have the narrowest nasal bones of any people in the world, but as Laughlin points out, the upper nasalia of this skull appear to be the narrowest yet recorded, even for Eskimo.

The archaeological evidence is less decisive. The only artifacts found in the burial vault were a triangular end blade of generalized Dorset type and three worked flakes. Contemporaneity of the artifacts and burial cannot be considered as certain. The artifacts might possibly have been on or just beneath the gravel surface when the grave was constructed. Thus the site itself could have been Dorset and the burial post-Dorset. Of the dozen other artifacts excavated from a house ruin and test pit near the burial, two quartz crystal microblade fragments are undoubtedly Dorset and several end scrapers and end blades are probably Dorset. On the other hand, another end blade (Laughlin and Taylor, 1960, Pl. III, *E*) has the rhomboidal shape of a modern Sadlermiut arrowpoint, though it seems too large to have been used as such. Finally, the stone burial vault appears to have been identical in structure to Sadlermiut vaults at Native Point, Southampton Island. In short, the archaeological evidence

fails to prove conclusively that the burial was that of a Dorset Eskimo. My own feeling is that more likely than not it was Dorset, a view essentially the same as that expressed by Taylor who named the site "Imaha", the Eskimo word for "maybe", as an indication of his "cautious acceptance of the archæological conclusions based on a small artifact sample in an archæologically little-known area." (Laughlin and Taylor, 1960, pp. 1-2).

While still dealing with probabilities, the situation at the early Dorset T 1 site on Southampton Island might be mentioned. None of the burials at or in the vicinity of the site could be proved, from artifact association or other evidence, to be Dorset. However, from the surface at or near the site we collected five greatly weathered skulls which had the appearance of being very old. Four of them had a very heavy lichen incrustation and all exhibited a far more advanced state of cracking, flaking, and erosion of the exposed bone surfaces than did any of the surface burials at the nearby Sadlermiut site which from the accompanying burial offerings were known to be Sadlermiut. The extent of weathering was fully as great as that seen on Dorset bone artifacts and animal bones found on the surface at T 1. It is highly probable, I believe, that these five skulls are Dorset, and it is therefore of interest to note that they are typically Eskimo, both metrically and morphologically. In fact, in some respects they conform more closely to the classic Eskimo cranial type than does the Payne Bay skull, for they all have quite narrow noses and extremely high orbits, and in most cases, a more prominent sagittal crest and a much more pronounced occipital protuberance.

The probability that the physical type of the Dorset people was Eskimo, as suggested by the finds at Payne Bay and T 1, is further indicated by two mandibles collected by Taylor at Dorset sites on Mansel and Sugluk islands and recently described by Oschinsky (1960). In this instance we are dealing with skeletal remains which are unquestionably Dorset as they were excavated from Dorset middens. Both mandibles, like the one from Payne Bay, not only show the form and dimensions expected of Eskimo, but also have well-developed mandibular tori, one of the morphological features most characteristic of Eskimo, where it has a frequency ranging from 40 to 87 per cent among various Eskimo groups from Alaska to Greenland, as compared with 11 per cent for American Indians (Oschinsky, 1960). The present evidence, scanty and inconclusive though it is, would lead one to expect that the physical type of Dorset man, when finally determined, will prove to be that of eastern Eskimo.

While the basic pattern of Eskimo culture in the eastern Arctic—the Dorset—appears to have emerged directly from preceding manifestations of the Arctic Small-Tool tradition, no such firm linkage can at present be demonstrated for the west. Here the archaeological picture is more complex and becomes increasingly so as new discoveries are made, such as those resulting from Giddings's work in the Kotzebue region. We cannot point to continuity in burin and microblade-core techniques from pre-Eskimo to early Eskimo, as in the eastern Arctic; these basic ingredients of the coastal Denbigh Flint complex and related microlithic complexes in the interior of Alaska are conspicuously absent in Alaskan Eskimo culture, except in the Aleutians where Laughlin and Marsh (1954) found microblades and cores occurring in the lower three-fifths of the Chaluka midden on Umnak Island. However, side blades, another important Denbigh trait, did carry through into early Eskimo, and on the

evidence of artifact form and flaking technique, the chipped stone industry of Ipiutak appears to have been derived from some inland variant of the Denbigh Flint complex (Giddings, 1951; Collins, 1954b).

Giddings's discovery of a new culture characterized especially by side-notched projectile points at Cape Krusenstern in a horizon intermediate between Ipiutak and Denbigh, raises new problems and injects a note of uncertainty regarding the expected transition from Denbigh to Ipiutak. In the Arctic, side-notched points of comparable form occur at other sites of some antiquity in Alaska and Canada, and then, surprisingly, at nineteenth century Sadlermiut sites on Southampton Island. Griffin (1962) remarks on the resemblance between the short stubby side-notched points from these localities and the Durst Stemmed projectile point, a late Archaic, Old Copper type from Wisconsin recently described by Wittry (1959a, b). The type is a distinctive one and its occurrence in the Archaic at an earlier period than in the Arctic suggests culture diffusion from south to north. The resemblance between some of the Durst Stemmed points and some of those made by the modern Sadlermiut Eskimos is indeed striking. Considering the great disparity in age and the fact that Sadlermiut stone implements as a whole display a considerable range of variability, the resemblance may be nothing more than a coincidence. On the other hand we know nothing whatever of the ancestry of the Sadlermiut stone industry; this particular type of short stubby side-notched point could be one which the Sadlermiut Eskimos inherited from some earlier and as yet undiscovered stage of culture in the eastern Canadian Arctic. If the Sadlermiut-Durst Stemmed resemblance is only coincidental it is the more striking because of a similar parallel between earlier stages of culture in the same two areas. I refer to the Raddatz side-notched points, another Old Copper type which Wittry finds at lower levels than Durst Stemmed in the Wisconsin rock shelters, and which bear a certain resemblance to some of the Dorset side-notched blades (e.g., Wintemberg, 1939, Pl. VI, Fig. 2).

It is of interest to note that the side-notched points found by Giddings on Beach 53 at Cape Krusenstern were accompanied by large straight-based lanceolate blades which almost certainly were used on whaling harpoon heads (Giddings, 1962, Pl. 2, 1-4), and that bones of bowhead whales were excavated at the site. Giddings notes the resemblance of the side-notched points to those of the Old Copper complex, but wisely avoids speculating on their meaning in this wholly unexpected context—that of an arctic coast culture with a “strong implication of whaling”—preferring instead first to work out their local relationships in the Bering Strait region. Whatever the explanation may be, it is a point of some theoretical importance that this distinctive type of implement should have been used by people living in such diverse environments as the Great Lakes region, the shores of Kotzebue Sound, forested and mountainous areas of interior Alaska, the inland tundra between Coronation Gulf and Great Bear Lake, and the barren coastline of Southampton Island in Hudson Bay. A parallel situation exists in the case of the Arctic Small-Tool tradition, with its Cape Denbigh sites on the shores of Norton and Kotzebue sounds and numerous other sites of closely related culture in tundra and spruce-birch forest areas of interior Alaska and Canada. A further example of near cultural identity in differing environments is that in northern Alaska where the implement typology of prehistoric and present-day Eskimos living in the forested interior, with a few

minor and expectable exceptions, is identical with that of neighboring coastal Eskimos of the same period. It seems to me that every recent discovery in arctic archaeology has tended to confirm the fact that certain kinds of culture traits, once established, have been diffused far and wide with high disregard for what might have seemed environmental barriers. This refers to traits of implement typology such as bone-working tools—burins for example—and to particular types of knives, scrapers, projectile points, and flaking techniques, that would be as useful to a maritime hunting people as to those living in interior areas where food resources and the way of life may be quite different. There seems no more reason why culture traits of this particular kind should be environmentally delimited in America than in the Old World, where they clearly were not. To mention only one of many possible examples, Mesolithic tools such as the highly distinctive and specialized geometrics occur in identical form in central India and Ceylon and then in the English moorlands, as well as at many other Old World localities in almost every possible geographical setting. It is traits of this kind, and others of the same nature but less sharply defined, that provide clues to cultural relationships between peoples in widely separated areas whose modes of life, of necessity, may have had little in common. In America, however, there is sometimes a tendency to see an overly close relationship between specific cultural manifestations and particular kinds of environment, and to over-emphasize the role of environment in the dissemination of culture. In the Eskimo field this point of view is reflected in the related concept of a rather sharp dichotomy between inland and coast, with the former the center of origin—a kind of *fata morgana* that has beset Eskimo archaeology for decades and which still exerts its residual influence, even though the concept in its original elaborated form no longer finds acceptance.

The hypothesis that ground slate implements had spread from the Eskimo area southward to the Northwest Coast and New England, which once seemed entirely logical and reasonable, is one of the casualties of radiocarbon dating. As Ritchie (1962) and Borden (1962) have pointed out, the use of ground slate is older in both of these areas than in the far north. On the lower Fraser River it was already a flourishing industry in the Marpole Phase (943 B.C.) and the Locarno Beach Phase (493 B.C.), whereas at early Eskimo sites in Alaska (Kachemak Bay I, 748 B.C.; Choris, 688 B.C.) ground slate blades were just beginning to appear. Moreover it was not until Kachemak Bay III and Punuk times (A.D. 600 to 1000) that ground slate achieved a dominance comparable to that at the older British Columbia sites. In view of these circumstances Borden (1962) expresses the belief, which is no doubt correct, that the rubbed slate technique was diffused northward from the Northwest Coast to the Eskimo.

Borden's suggestion of an Asiatic origin for the ground slate industry of the Northwest Coast is more doubtful. Slate grinding was not a very prominent feature of the Siberian Neolithic, and one of the most important American types—the tanged slate blade—was completely absent. The resemblances between the Siberian and British Columbian forms cited by Borden do not seem to me to be close enough to support the hypothesis of a Siberian origin (see also Griffin, 1962). The fact that ground slate implements have not been found at pre-Eskimo sites around Bering Strait, the supposed point of entry, or anywhere else in Alaska, in itself weighs heavily against the theory. So does the

enormous time range of the Siberian complexes which are supposed to have contributed slate and other features to the Fraser delta cultures: the Khina stage, estimated date fifth millennium B.C.; Isakovo, 4000–3000 B.C.; Serovo, 3000–2500 B.C., and Kitoi, 2500–1700 B.C. It is difficult to envisage the mechanism by which these Lake Baikal-Upper Lena cultures, so disparate in age and 4,500 miles away, could have contributed to the formation of a well-defined stage of culture in British Columbia, radiocarbon-dated from 943 B.C. to A.D. 179.

On the other hand, the resemblances between the British Columbian slates and those of the eastern Archaic are in some instances so close as to suggest a genetic relationship, and here there are no time difficulties. Slate end blades of the Marpole-Locarno Beach phases and the eastern Archaic have not only the same general form but share such specific details as beveled tangs (Borden, 1962, Pl. 3, *k*; Moorehead, 1922, Fig. 46), beveled edges (Borden, 1962, Pl. 3, *a*; Moorehead, 1922, Fig. 58), a median ridge (Borden, 1962, Pl. 3, *e*; Moorehead, 1922, Fig. 58), and tiny notches along the edges of the blade above the tang (Borden, 1962, Pl. 3, *l*; Moorehead, 1922, Fig. 56). Also, the forked tangs of some of the British Columbia points (Borden, 1962, Pl. 3, *d, e*) are suggestive of Old Copper forms. Considering that some of the other traits mentioned by Borden—bone whistles, beaver tooth knives, and stone fish effigies—are also present in the eastern Archaic, it would seem reasonable to conclude that this American manifestation, older but not too much older than the Fraser delta assemblage, and occurring on the same continent, was the source from which the Pacific complex was derived. There is at present a wide geographical gap between the eastern and Pacific ground slate complexes. The explanation may well be the great postglacial changes in elevation and ecological conditions in the intervening areas discussed by Byers in this volume. Byers thinks it likely that connections between the eastern and Pacific complexes may eventually be found in the areas west of the Great Lakes and Hudson Bay, but warns that the line of diffusion probably followed an old strandline which lies “far from the modern one and from modern routes of travel”, and which may be difficult to discover.

Because traits of supposed Asiatic origin such as those we have been discussing are absent at pre-Eskimo sites in Alaska, Borden assumes that they were transmitted across Bering Strait in the millennia before Eskimos occupied the region. At that time, he suggests, the ancestors of the Eskimos lived in a region some distance from the main diffusion routes into America, perhaps in southwestern Alaska. Here we have a revival of the once widely held “Eskimo wedge” theory, but with a new twist. The original theory as propounded by Boas and others held that the original home of the Eskimos was somewhere in the Canadian Arctic, and that in fairly recent times they had moved westward to Bering Strait, thereby breaking off a long-established contact between the Northwest Coast Indians and the Paleo-Asiatics of northeastern Siberia. While archaeology provided the *coup de grâce* to this particular theory some thirty years ago, Borden’s alternative version of southwest Alaska as the original Eskimo homeland is not to be dismissed out of hand. The Aleutian and Kodiak islands and the territory between Bristol Bay and the Kuskokwim had a population density greater than that of any other Eskimo area. Moreover the radiocarbon dates of 1000 B.C. and earlier for the Chaluka midden on Umnak Island

are the earliest recorded for Alaskan Eskimo. Okvik art occurs sporadically in southwest Alaska, and I have suggested the possibility that the Okvik culture might have originated in this area rather than northeastern Siberia (Collins, 1954b). However, I would prefer to regard this as a possibility rather than a probability. The principal point I would raise concerning Borden's theory is the supposition that the Eskimos *arrived* at Bering Strait at some particular time. As new evidence accumulates it becomes increasingly difficult to think of the Eskimos as having moved into Bering Strait from some other area; rather, it appears that the carriers of Eskimo culture, or more properly their ancestors, have lived around Bering Strait for some thousands of years, and that their culture developed there. To be sure, the earliest date for Eskimo in the general Bering Strait area is only 688 B.C. (Choris); and Okvik, the earliest Eskimo stage at Bering Strait proper, dates from only 307 B.C. (or even A.D. 316-537 if Rainey and Ralph's later determinations (1959) are correct, which I doubt). However, in Okvik-Old Bering Sea we have a highly specialized Eskimo culture at the peak of its development. Its elaborate and sophisticated art and its complex implement typology could only have been the result of many centuries of growth. The stages of culture leading up to Okvik are as yet unknown, but sites of this period undoubtedly exist and should eventually be found around Bering Strait. It should be remembered that the Okvik sites on Punuk Island and at Gambell, St. Lawrence Island, were both discovered accidentally, being completely buried beneath the sod and rocks. Pre-Okvik sites may be equally hard to find.

In view of Giddings's remarkable and unexpected finds in the Kotzebue area, there is little point in speculating on the antecedent stages of Choris culture, except to note that Giddings suggests that it "was a well-established culture in Alaska, perhaps in the line of development of the later cultures out of a Denbigh Flint complex base." (1960a, p. 127). The approach Giddings is now employing, that of correlating culture stages with old beach lines, holds high promise of revealing a complete record of culture succession in northern Alaska from early pre-Eskimo to Eskimo culture of today.¹ It seems highly probable that Bering Strait, one of the richest hunting territories of the world, has been occupied for the greater part of the postglacial period during which it has been a waterway and not an isthmus. Among the culture patterns that developed in

¹It should be noted that Giddings's "beach ridge archaeology", based on culture materials of differing typology found on a long succession of old beach ridges (114 at Cape Krusenstern) *at the same elevation* in an unglaciated area unaffected by isostatic changes of sea level is a far better guide to relative chronology than are the *raised* beaches in the central Arctic, formed by a continuous lowering of sea level following the postglacial marine submergence. For example, as mentioned earlier, the height above sea level of Thule culture sites on Cornwallis Island has no bearing on their relative ages, for there is abundant and conclusive archaeological evidence that a village site on the second beach ridge, at an elevation of 20 feet, was contemporaneous with one on the ninth beach line at 64 feet. The explanation is probably that the same people found the lower beach a more suitable location for a summer village and the higher beach—*because* of its higher elevation—suitable for a winter village. On the other hand, in an area where the old strand lines are all at the same elevation, as at Cape Krusenstern and at Gambell, St. Lawrence Island, there is no conceivable reason why a maritime people should build their houses far back from the present shore. Such sites, as Giddings points out, must have been occupied when the beach on which they are located was near the shore.

this peculiarly favorable environment—on both sides of Bering Strait—was that of the Arctic Small-Tool tradition, the carriers of which, in all probability, were the direct ancestors of the Eskimos.

I would like to emphasize *both sides* of the Strait. It is true, as Giddings (1960a) has pointed out, that the Denbigh Flint complex has not been identified, as a complex, in Siberia. But some of its most important elements—burins, microblades, and cores—occur in the Lena Neolithic and the recently discovered pre-ceramic cultures of Japan (Yoshizaki, *et al.*, 1959; Befu and Chard, 1960). Considering how little work has been done in the Chukchi Peninsula area it is not surprising that Denbigh-like material has not yet turned up nearer Bering Strait. The fact that the burin and blade-core industries—basic features of the Old World Paleolithic and Mesolithic—hold so prominent a place in the Denbigh Flint complex, has implications as important as those arising from the present known geographical distribution of the complex. While the complex itself may be considered as indigenous to the Bering Strait area because it developed there as a complex, its basic elements extend far back in time and space in the Old World, and it is these that provide the clue to its ultimate origin.

Irving (1962) is to be commended for defining more precisely the Northwest Microblade tradition (MacNeish, 1959b, 1960), the Denbigh Flint complex (Giddings, 1951), and the traits which they comprise. Such precise definition is the necessary first step in any descriptive or comparative analysis, but it has a further value as a means of determining *degrees* of relationship. Thus the recognition of specific differences between the two northern microlithic assemblages should not be taken as disproof of a general relationship between them. I would agree with Griffin (1962) that "Their basic relationship is at least as important as their recognized differences."

Irving (1962) speaks of the possibility that sites needed to connect the Denbigh Flint complex with similar manifestations in Siberia may now be under water. Since the greater part of the Bering Sea, Bering Strait, and much of the adjacent Arctic Ocean was a land surface during and immediately following the last glaciation, it is obvious that any sites established there would now be submerged (Smith, 1937; Collins, 1943, p. 233). Such sites, however, would be far older than those of the Denbigh Flint complex. The Cape Denbigh site on Norton Sound was undoubtedly established when sea level was the same as today (Collins, 1953b, pp. 199–200; 1954a, p. 103), and this is also true of the Denbigh occupation on beaches 101 to 103 at Cape Krusenstern (Giddings, 1962).

Traces of the early people who crossed the 1,000-mile wide land bridge now beneath the waters of the Bering and Chukchi seas should eventually be found in Alaska. Two possibilities might be suggested. The first Americans might have taken a northern route along the Arctic Slope, a 400- to 3,500-foot high plateau immediately to the north of the Brooks Range. The greater part of this foothill region, unlike the mountains of the Brooks Range, was unglaciated during the last ice advance. The well-drained, treeless ridges of the Arctic Slope could have been occupied by man throughout Wisconsin time, as well as later. It might be noted that the fluted point reported by Thompson (1948) was found on the surface of one of the east-west trending ridges in this foothill region. There should be a good chance of finding here habitation or campsites

as old or older than early man sites to the south, and such was the objective of field investigations by John M. Campbell and Ralph Solecki in the summer of 1961.

While the northern route seems highly promising, there is no reason to assume that it was the only one followed by early man. Some other groups—earlier, later, or at about the same time—might have followed the southern margin of the land connection which stretched from the Gulf of Anadyr to southwest Alaska in Wisconsin time. Hopkins's penetrating study (1959) of the geology, paleontology, physiography, and climatology of the Bering Sea–Chukchi Sea land bridge encourages one to speculate on early movements of man in the area. As Hopkins points out, the now submerged surface of the Bering–Chukchi platform is almost devoid of relief. As a land surface it was a flat featureless plain broken only by a few rocky buttes and low mountainous areas that are now the Diomedes, St. Lawrence, St. Matthew, and Pribilof islands. The evidence of paleobotany and plant geography summarized by Hopkins shows clearly that the land bridge supported a treeless tundra vegetation like that of today, and that at no time during the Pleistocene did forests invade the area: "The conclusion that the land bridge existed only during major glacial intervals leads to the inference that the climate there was at least as severe as the present climate around the shores of Bering and Chukchi seas. . . . During Wisconsin time the land bridge had an arctic climate characterized by cold summers and severe winters; it supported treeless tundra vegetation; and animals migrating between the continents had to adapt to life in a tundra environment" (Hopkins, 1959, p. 1,527).

The low relief of the Bering–Chukchi platform would suggest a swampy tundra like that between the lower Yukon and the Kuskokwim, in which case people moving into the area would probably have found the sea coast a more attractive habitat than the interior. If they did follow such a coastal route they would have ended at Bristol Bay, possibly by way of the Nushagak River which, 25,000 to 13,000 years ago might have flowed into Bering Sea (possibly merged with the Kuskokwim?) somewhere near the Pribilofs. Continuing up the Nushagak, if we may continue our speculation, they would have found themselves hemmed in by the glaciers of the Alaska Peninsula and Alaska Range on the east and of the Kilbuck Mountains on the west. The Nushagak valley, however, was ice-free during the last glaciation (Mertie, 1938; Hopkins, 1959, Fig. 3). In the nineteenth century this was a region unusually rich in animal life. In the summer tremendous numbers of salmon ascended the river and its tributary streams, as a result of which Nushagak became one of the principal salmon fishery centers in Alaska. Land mammals of the district included caribou, moose, mountain sheep, black and brown bear, arctic hare, lynx, wolf, red fox, ground squirrel, marmot, beaver, land otter, mink, and marten. Geographically, the Nushagak region was better suited to human habitation than some other parts of Alaska. The banks of the river and its tributaries support a forest growth of spruce, birch, and poplar in a continuous three-mile wide strip up to the Nushagak Hills, 150 miles in the interior. These hills, rising to an altitude of about 2,400 feet above sea level with an average altitude of 1,500 feet, are covered with tundra vegetation except for the main river valleys, which are timbered. Parts of the Nushagak River are bordered by abrupt bluffs from 40 to 200 feet high (Mertie, 1938).

The geographical features of the Nushagak area, and its rich and varied food resources, recommend it as a possible route by which early man could have entered Alaska. Its greatest advantage might well have been the enormous salmon runs which would have provided an abundant and unfailing supply of food during the summer season. Requiring no great effort and no special skills or techniques, the exploitation of migratory fishes no doubt held an important place in the food economy of early man, particularly after he had hit upon the simple device of curing the fish for future consumption. As Borden has pointed out (1962), the earliest inhabitants of the Fraser and Columbia river region depended on migrating salmon as their principal source of food. It might be suggested that this was not an adaptation first initiated in the Pacific northwest, but continuation of a very ancient practice developed earlier by riverine and maritime peoples in the Amur-Anadyr region of Siberia and in southwest Alaska.

THE GREAT LAKES TO THE BARREN LANDS

Richard S. MacNeish

At the outset let me say that I shall include southern Manitoba as a part of the Great Lakes region and Great Bear Lake as a part of the Barren Grounds. In this way I am able to refer to some excavation data.

The earliest set of relationships that we have are in terms of sites with Plainview points. The excavated Franklin Tanks component from the east end of Great Bear Lake (MacNeish, 1956b) and a single point from near Yellowknife are the northern representatives (MacNeish, 1951, p. 30, site 33). On the basis of the point type they seem related to the Brohm site component near Port Arthur, Ontario (MacNeish, 1952), as well as to sites producing Plainview points on their surfaces in southwest Manitoba (MacNeish, 1958). In the two excavated components not only are the projectile points held in common but so are a number of more general traits, such as large snub-nosed end scrapers, round and square-nosed bifacial knives, side scrapers, and bifacial ovoid choppers. Further, both are associated with high beaches. Exact dating is more difficult, but a guess might be that both existed between 4000 and 7000 B.C. The question of the direction of their relationships is difficult to discern. Quimby's recent dating of the Brohm site as 6000 to 7000 B.C. might indicate a northward movement (Quimby, 1960, p. 37). Perhaps both are peripheral to earlier Plainview development in the western Great Plains of the United States.

At about the same time, might be placed the Taltheilei complex projectile points, which have been noted as resembling the Plains Scottsbluff type (MacNeish, 1951). The similarity, however, is not too convincing, nor the Taltheilei complex well known, so assessment of this relationship must wait further information.

On a slightly more recent level, about 3000 to 4000 B.C. according to C-14 dates from Great Bear River (MacNeish, 1956b), are the relationships indicated by the Agate Basin (or Agate Basin-like) points. These points are, of course, widespread in the Great Plains on a slightly earlier time level (Wormington, 1957). A few that might be classified as such occurred at the Sheguiandah site on Manitoulin Island, Ontario (Lee, 1957) and they are common in southern Manitoba, in areas outside of the Lake Agassiz basin (Elson, 1957). They are found in northern Manitoba at Caribou Lake and Reindeer Lake and extend to the Barren Grounds at the Maguse site north of Churchill (Giddings, 1956). Farther north they occur at a large number of sites in the region from the Dubawnt River (Harp, 1959a), Artillery Lake (MacNeish, 1951), and Baker Lake (Harp, 1962¹). Here, all the components are classified as the Artillery

¹All 1962 dates refer to papers in this volume.

Lake complex. The total assemblage of these artifacts is much like that in the Plains in that it has nodule bifacial choppers, keeled snub-nosed end scrapers, and Agate Basin points as well as more generalized traits. Complexes with Agate Basin points also occur to the north on the Great Bear River (MacNeish, 1956b) and Dismal Lake (Harp, 1958), as well as the Firth River (MacNeish, 1959a), Liard River (MacNeish, 1954), and in the Champagne complex (MacNeish, 1960) in the southwest Yukon. These northern complexes differ slightly in having occasional burins and a few crude prismatic blades. That these complexes are related to those of the Great Plains cannot be doubted. The earlier dates from the south would seem to show a northward diffusion or migration. I would like to suggest that this tradition developed in the Great Plains and its subsistence was based on herd (buffalo) hunting. Further, as the glacier retreated and the north became more grassy, these people followed the northward expansion of the buffalo and on entering the Barren Grounds they shifted their economy from buffalo herd hunting to caribou herd hunting.

On the next time level, 1000 to 3000 B.C., there seem to have been two traditions in the northern Barren Grounds. One is represented by finds on the North Knife River, Manitoba (Giddings, 1956), Dismal Lake (Harp, 1958), Baker Lake (Harp, 1962), Pelly Bay (Rousselière, n.d.), and Igloolik (Meldgaard, 1960a). These components seem to have belonged to the Arctic Small-Tool tradition, and were ultimately derived from the New Mountain complex on the Firth River (MacNeish, 1959a), the Natvakruak complex (Campbell, 1962) of the Brooks Range, Alaska, and the Denbigh Flint complex (Giddings, 1951). In my opinion this represents an invasion of peoples from the northwest within the Arctic and Hudson Bay drainage tundra region. It is possible that the so-called Boreal Archaic or pre-ceramic complexes in the Great Lakes region derived from this complex such traits as the adze, bow and arrow, comb, polyhedral core, and blade chipping technique, as well as hunting techniques for sea mammals (or large fishes), burial ceremonialism, and the idea of ground projectile points or knives (there might have been a shift from ground bone ones in the Arctic Small-Tool tradition to ground slate ones in Archaic).

The second tradition in the north at this time seems to have been inland oriented and is represented by the Lockhart River complex (MacNeish, 1951) (including the Selwyn and Kamut complexes (Harp, 1958)) and the N.T. Docks complex. Basically it is an eastward late extension of the Northwest Microblade tradition (MacNeish, 1959b) which was dependent upon a lake-fishing economy. It is possible that it derived its side and corner-notched points, its notched and thumbnail end scrapers, and its drills from the Great Lakes Archaic (Quimby, 1960). It may have given to them a series of kinds of bone fish spears, new kinds of traps and snares, snowshoes, polyhedral cores and blades, gill net fishing (i.e., net sinkers) and various lake-fishing techniques. Quite frankly, except for the Old Copper culture (Ritzenthaler and Wittry, 1952) and the Larter Focus in southwest Manitoba, the Archaic of the western Great Lakes and Manitoba is too poorly known for us to say any more than that there are hints of relationships.

This lack of knowledge of the Archaic of this area, makes it impossible to accept Quimby's stimulating hypothesis (Quimby, 1962) that Old Copper copper techniques diffused northwest from the Great Lakes to the Yellowknife

tribe and ultimately to the Copper Eskimo. It is a nice idea, but so far there is not a scrap of evidence to support it.

On a more recent level, relationships are even harder to discern. This region should be a crucial one in terms of the hypothesis of an Asiatic derivation of Woodland pottery and burial mounds. So far it has yielded nothing on these subjects.

This also might be the region from whence came the so-called Indian influence or northward invasion of the Dorset people. There is no evidence for this. I would like to add that the so-called Indian elements in Dorset could just as well have come from something like Lockhart River as the northeast Archaic or Woodland cultures. Perhaps the best we can say is that the various small notched and triangular points (arrowpoints) are extremely similar on late horizons and do represent a relationship throughout this region.

All in all, the tracing of relationships between the Great Lakes and the Barren Grounds is not very satisfactory. This dissatisfaction is due to relatively meager knowledge on any time level and the fact that the crucial middle area—northern Saskatchewan, northern Manitoba, and northwest Ontario is *terra incognita*.

NEW ENGLAND AND THE ARCTIC¹

Douglas S. Byers

Extensive literature demonstrates man's persistent interest in his predecessors in the arctic and subarctic zones, as well as his propensities for jumping to conclusions. According to Gjessing (1944), as long ago as 1871, Oluf Rygh was drawing attention to similarities between barbed slate heads from Scandinavia and others from "northernmost British North America."

Ritchie (1951a, and 1962²) has summarized successive steps by which conjecture regarding Eskimos in the northeastern states and Canada became transformed into assertions and, eventually, dogma. Because knives, lance heads, and harpoon blades of slate were made and used by historic and proto-historic Eskimos, it was assumed that similar implements in the northeast gave evidence of cultural influences from, or prior residence by, these people. This archaeological mythology forms a background which has colored thinking processes; to this day, ground slate tools, and especially semilunar knives, conjure up for adherents to this creed visions of groups of Eskimos marching and countermarching through eastern North America.

Spaulding's (1946) excellent summary covers most of the literature on this subject published before Pearl Harbor. Since that time many new titles have appeared, and new vistas have been opened by each new discovery. Particularly important have been radiocarbon dating, offering new perspective, and excavation of stratified sites in the High Arctic, supplying much-needed evidence of the growth of arctic cultures. Together, these developments have rendered invalid conservative conclusions of twenty-five years ago.

Purposes of some older studies are not germane to the present problem. Conclusions may not now be acceptable, but distributional data used by Birket-Smith (1929), Gjessing (1944), and de Laguna (1947) still are valid. For example, among Birket-Smith's traits having wide distribution south of the arctic and boreal zones of the New World are such items as stone vessels, lances, multi-pronged darts, throwing boards, leisters, harpoons, gorges, ulus, and eyed sewing needles. He states (1930, pp. 474, 475) that "A knife, exactly like the Eskimo ulu, is known on the North Pacific Coast and the interior plateaus, as well as in the east as far south as Georgia [and, in the Old World] . . . from Mongolia, Manchuria, Japan, and northern China".

Wide distribution of such traits is of great significance to our problem. It is likely that detailed study will also demonstrate wide distribution in time

¹This paper has been read by several friends who have offered helpful advice in a number of places. While I would like to thank in particular Frederick Johnson, William A. Ritchie, William E. Taylor, and Henry B. Collins, I must make it clear that they are not responsible in any way for thoughts expressed here.

²All 1962 dates refer to papers in this volume.

and space among arctic and boreal peoples of methods of working stone, styles of implements, and unspecialized elements of bone industries. Steps in this direction have been undertaken by Borden, Harp, and MacNeish in this volume, and elsewhere.

A culture "is a very composite phenomenon, in which elements from widely different sources and of greatly different ages gather together, not into an accidental and incoherent conglomerate, but a harmonious, working organism" (Birket-Smith, 1929, pt. 2, p. 222). MacNeish (1962a) supports this view with the observation that "the various elements of each tradition came from a variety of sources and by a variety of processes . . . [coalescing] in certain areas at certain times, perhaps due in part to ecological conditions." This concept permits single elements or coalesced elements to pass from group to group, as it also permits rejection of elements not suited to local conditions. This view, rather than the concept of a "pre-packaged" culture, appears to be more in keeping with observed distributional data.

Although ground slate implements and semilunar knives are frequently linked in archaeological literature, this conjunction is not supported by recently excavated specimens. Not only does Birket-Smith's data refute this, but de Laguna's (1934) data indicate that although slate grinding appears in Kachemak I, it does not become dominant until Kachemak III, by which time semilunar knives appear in numbers. Borden's discoveries offer a reasonable parallel.

The semilunar knife has long been known from eastern North America. Hypotheses have been built around specimens in private collections and in museums, but few if any of these specimens were systematically excavated (see Willoughby, 1935; Birket-Smith, 1929, pt. 2, p. 355). Most of them were out of context, and only associated with other polished slates by hypothesis. It is significant that Benjamin L. Smith (1948), in his exhaustive study of collections both private and public, was unable to find any record of a semilunar knife which had been excavated from a grave of the Moorehead complex in Maine. Nothing is forthcoming to associate specimens found by Hadlock and Hall (Byers, 1959, p. 251) with it, while the ten specimens from Maine referred to by de Laguna (1946, p. 125) cannot be placed in any context. The semilunar knife does not appear to have been of sufficient antiquity in Maine to have been included in Moorehead burials in spite of belief (Spaulding, 1946; de Laguna, 1946) that it belonged with the complex.

Twenty-two excavated specimens from New England are distributed as follows:—from Maine, one from Ellsworth Falls of uncertain association (Byers, 1959, p. 249); from Massachusetts, twelve, of which three were from Foster's Cove, one from Maude Eaton VI and a possible one from Maude Eaton VII, all in Andover (Bullen, 1949), and seven from Wapanucket 6, near Middleboro. These seven include a complete specimen found with Burial 3; a second complete one found in yellow soil; a fragment of what may be an unfinished specimen, in the loam; two fragments of a single knife, one in Lodge Floor 6 and one in yellow soil; and three other fragments found in yellow soil (Robbins, 1960, pp. 49, 50). Nine knives were represented at the somewhat puzzling Donovan site, near Vergennes, Vermont (Bailey, 1939).

In central New York, Frontenac Island produced what may be a fragment of a knife, described as an engraved fragment of slate (Ritchie, 1944, Pl. 148, 2) but this seems to be the only ground semilunar from the Brewerton and Frontenac foci. A footnote on page 246 (Ritchie, 1944) mentions a chipped knife

found on the river bank below the Oberlander No. 1 site, and therefore not in stratigraphic position.

The Hudson valley has yielded eleven specimens (Ritchie, 1958). Three knives were found at the River site, while three more were found on the surface nearby; four finished knives and others in process of manufacture were found at the Bannerman site, and a fragment came from South Cruger Island. Fifteen were found at the Abbott Farm, near Trenton, New Jersey (Cross, 1956).

Although fragments of what were believed to be polished slate points, or points themselves, were found at the Donovan and Frontenac Island sites, and one is alleged to have been plowed from the surface of the Robinson site at Brewerton, such implements were not found at the River site, the Bannerman site, South Cruger Island, Wapanucket, Foster's Cove, Maude Eaton, or the Abbott Farm. Slate was used for chipped points and other implements at the latter site.

De Laguna (1946) has discussed most of the older specimens. Her exhaustive work (1947, p. 183) shows that 213 ulus could be located according to modern political boundaries. The distribution of these specimens and the excavated specimens which we have listed above is as follows:

Maine and the Maritime Provinces	19	New York	more than 70
New Hampshire	7	New Jersey	52
Vermont	9	Pennsylvania	9
Massachusetts	40	Delaware	3
Rhode Island	5	Ohio	1
Connecticut	15	Ontario (probably south of Ottawa)	33

Radiocarbon dates for some sites which produced ulus will be found in Fig. 1. Discussion of some dates is given later, but it is clear that the majority of the dated sites are approximately 4,000 years old, or slightly older. The relation of the radiocarbon sample to ulus or to other archaeological phenomena is not always clear.

The greater part of the region in which these sites lie is now under hardwood forest, which is not a boreal forest, even in the north where it may occur as a mixed hardwood and white pine forest, with complexities arising from differences in soils, drainage, water supply, and exposure. Andover and Middleboro lie near the limit of the oak-chestnut forest, the coastal aspect of the great hardwood forest which also extended over western New Jersey and the Hudson valley. One may argue climatic change, contending that boreal forests prevailed in these regions when people were making ulus. But this could only be so if paleobotanists have been misled, for Deevey (1957) indicates that his C1 pollen zone with oak and hemlock is in the neighborhood of 7,000 years old in southern Connecticut, and 6,000 years old in south central New England, while the corresponding birch-hemlock zone is 6,000 years old in northern Maine and Nova Scotia. Furthermore, this evidence is backed up by carbonized nuts from Lamoka and Frontenac Island (Ritchie, 1944) which argue almost incontrovertibly against the presence of a boreal forest at those sites during occupation by the aborigines.

Such evidence gives the *coup-de-grâce* to the assertion that the ulu is an implement primarily of a *northern* forest. It appears to have been developed south of the boreal forest. Indirect suggestions that the ulu belongs with Dorset have been made for many years, but until ulus *are* excavated from Dorset sites it would be better to hold this matter in abeyance.

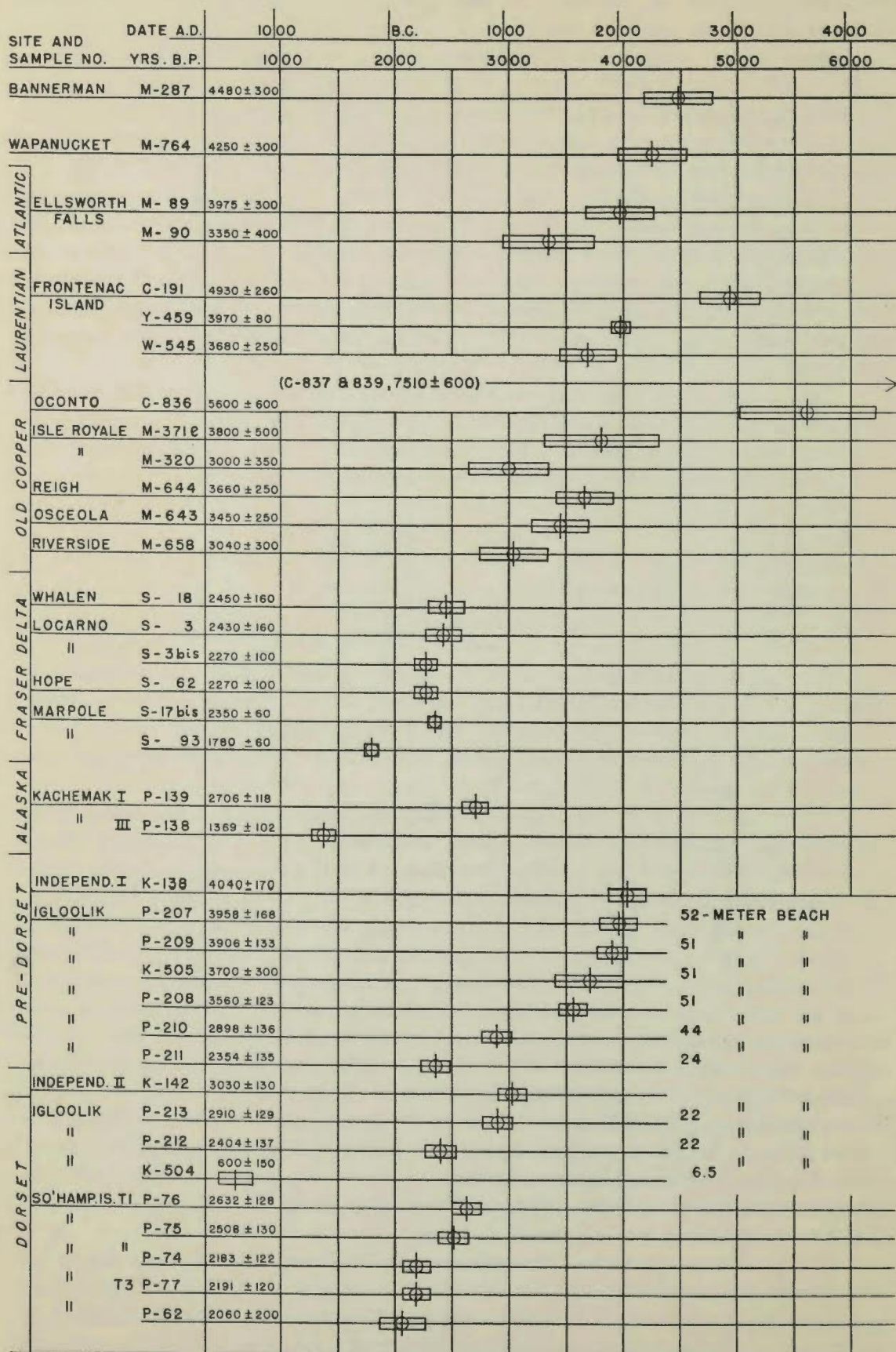
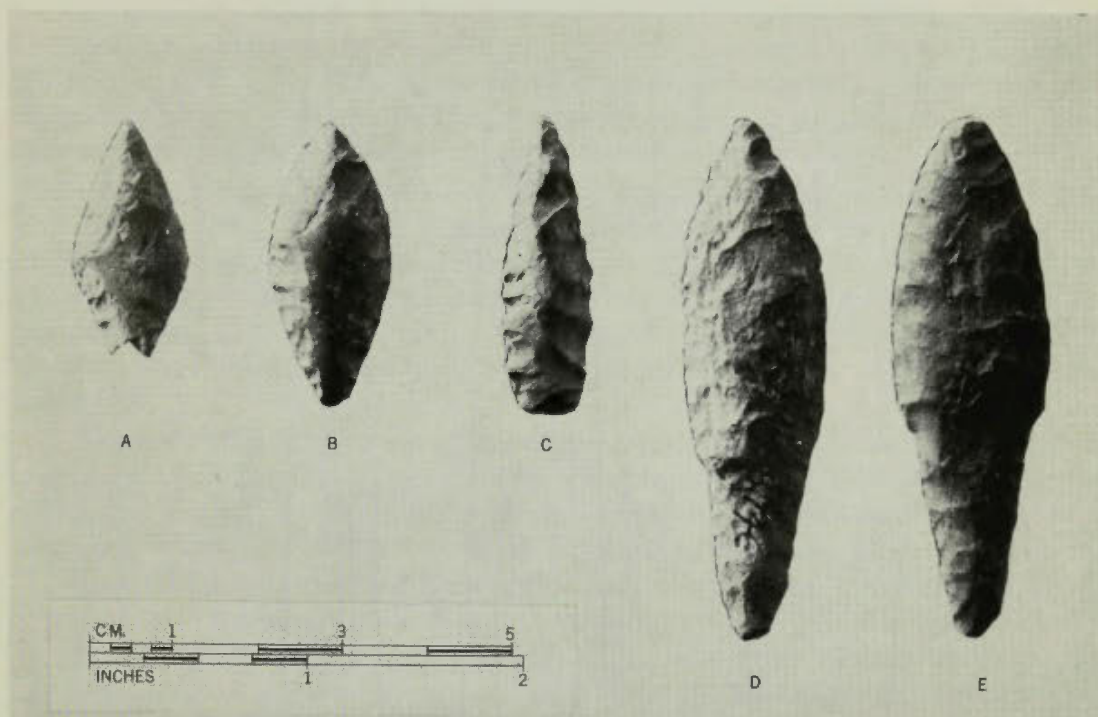
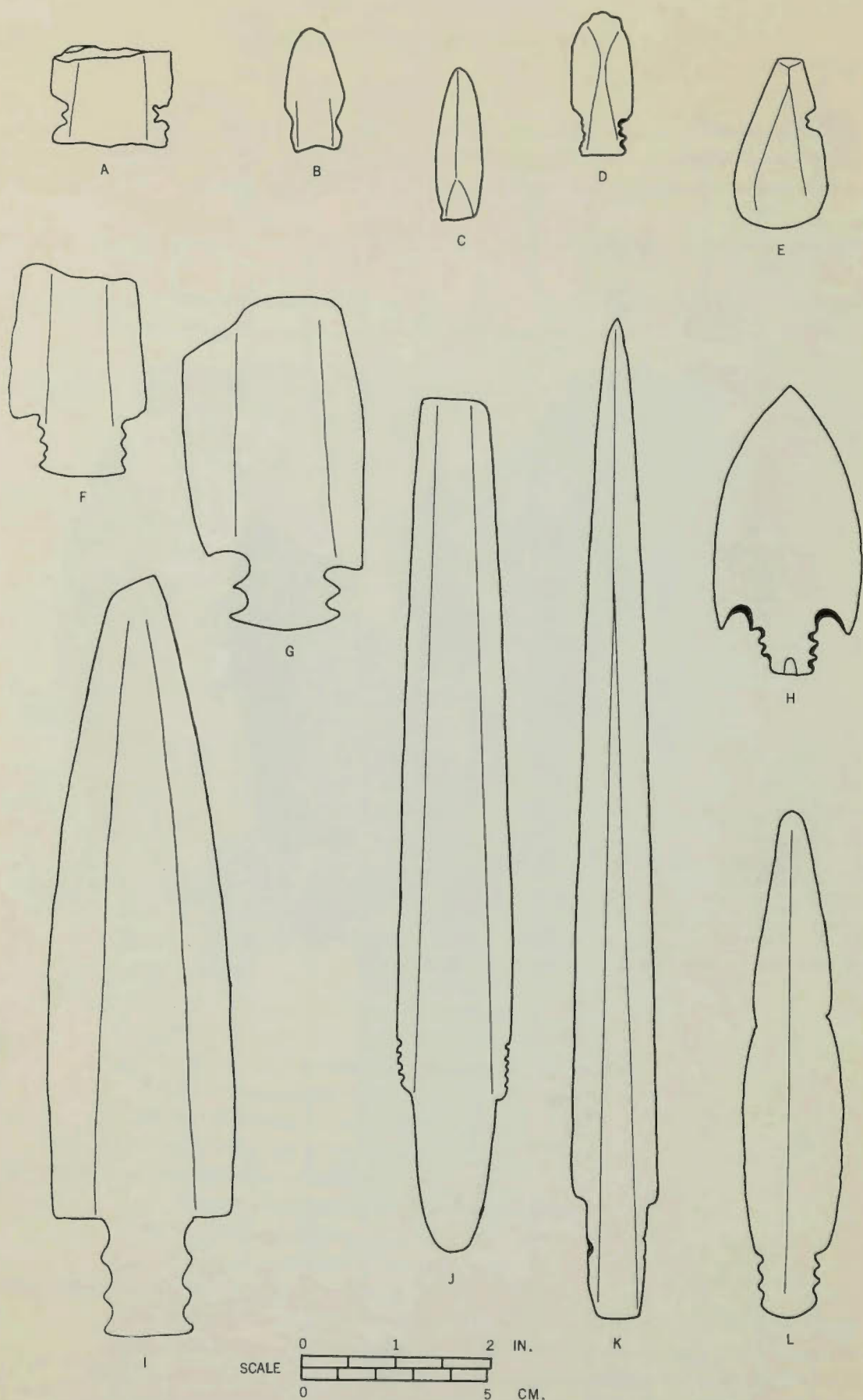


Fig. 1. Schematic representation of radiocarbon dates and their ranges of probable error.



Pl. 1. Tapered-stemmed points from Sarqaa in the Porsild Collection, Peabody Museum of Harvard. (Published by courtesy of the Museum).



Pl. 2. Outlines of slate points from Dorset sites, and from New Brunswick and Maine. *A-D*, Toonoo site, Sugluk Island; *E*, Sima site, Mansel Island; *F*, Nevin Shell Heap, Blue Hill, Maine; *G-I*, lower St. John drainage, New Brunswick; *J, K*, the Haskell Cemetery, Blue Hill, Maine; *L*, Old Copper, White Lake, Waupaca Co., Wisconsin. *A-E*, National Museum of Canada; *F, J-L*, R. S. Peabody Foundation, Andover; *G-I*, New Brunswick Museum, St. John.

Perhaps it is cynical to observe that Jenness's (1925) remarkably able segregation of Dorset specimens from a mixed collection introduced a new and little-known culture as a possible donor or recipient of traits shared by arctic and forest peoples. A number of hypotheses were advanced, and assertions were made in all sincerity to explain observed archaeological phenomena. These were based on detailed and searching study of collections. They were not fully backed by data secured by excavation. For example, de Laguna's identification of some specimens illustrated (1946, Fig. 16) as of Dorset origin is now open to question. Up to this moment, very little excavation has been carried on in Newfoundland and Labrador, one area cited as a possible source for Eskimo-like influences on the northeast. Collins, Larsen, Meldgaard, O'Bryan, Rowley, and Taylor, all of whom have contributed so greatly to more precise definition of the content of Dorset culture have yet to produce from pure Dorset sites evidence of several traits once attributed to Dorset.

Rowley's work at Abverdjar (1940) provided much-needed perspective for pioneer work done by Jenness and Wintemberg in 1927 and 1929, but until 1948 this was an outstanding exception. Wintemberg (1939, 1940) seems to have excavated only at Portland Creek, whence 2 feet of soil had been eroded by the wind, and at Cow Head, from which 2 to 5 feet had been similarly eroded. At these sites he found "very little more than was obtained from the surface."

Harp (1951) excavated at several sites in Newfoundland, and also in Labrador. His findings have not as yet been fully published although an extremely important unpublished thesis (1952) is in the Peabody Museum at Harvard. This constitutes our most dependable archaeological reference for Newfoundland; and this, and Junius B. Bird's work (1945) are our dependable sources for archaeology in southern Labrador.

Almost without exception other collections from Newfoundland and Labrador have been made by persons other than the investigator. Some collections are well segregated according to the character of the sites, others are mixed, including objects of Dorset character intermingled with objects of "Newfoundland Aberrant" (Harp, 1951) or general Boreal Archaic character. It is often impossible to tell whether mixture occurred as the result of carelessness on the part of collectors, whether the site was successively occupied by non-Dorset and Dorset groups, or whether acculturation truly occurred. A series of carefully controlled excavations at several selected sites in Newfoundland and Labrador is sorely needed to clear up the confusion, and to determine the existence or extent of interchange between Dorset Eskimo and Indian which Meldgaard (1960a) suggests.

Internal evidence throws some light on old collections. The Owen Bryant Collection at the Peabody Museum of Harvard represents a number of good Dorset sites, some which are not Dorset, and some which may be mixed. The Kidder Collection, in the same museum, includes a fine collection of Dorset harpoons and chipped implements together with some extraordinary bone and ivory pendants, all from one grave at Port aux Choix; other items from a different area are not certainly Dorset. Through the courtesy of Dr. James A. Ford and Dr. Junius B. Bird I have been able to examine the Mallery Collection, of the American Museum. It, also, represents Dorset and non-Dorset sites.

The large point with tapered stem illustrated by Ritchie (1962) in Pl. 1, *a*, is from Mallery's Site 8, Anse l'Amour, Forteau Bay, Labrador. Mallery's

collection from this site is completed by two more tapered-stemmed points, shorter, broader, and less skilfully made, two side-notched points (Ritchie, 1962, Pl. 1, g) and a large, unfinished, laurel-leaf blade.

Dr. Elmer Harp has generously allowed me to examine his collection from Forteau Bay, which includes specimens comparable to those gathered by Mallery. Dr. Harp, furthermore, pointed out that Anse L'Amour is an alternative name for L'Anse aux Morts. Mallery's site 8 is probably Harp's (1951) Forteau Bay 3.

Both Mallery's and Harp's collections from this site are remarkable for lack of characteristic Dorset implements. The objects which Dr. Ritchie illustrates in his Pl. 1, a, g, are similar to northeastern Indian artifacts because they *are* northeastern Indian artifacts. Dr. Ritchie has endeavored to connect his Pl. 1, a with small, slender, symmetrical Sarqaq blades described by Larsen and Meldgaard (1958) but it shows few characteristics which they ascribe to this form. The small collection from Qerqertaq and Sarqaq presented to the Peabody Museum of Harvard, by Morten P. Porsild, probably in 1915, includes such points, some of which are illustrated in my Pl. 1. The grinding which is evident on one or both faces of twenty-two specimens collected by Larsen and Meldgaard is also clearly evident on some specimens (Pl. 1, A, B) in the Porsild collection. On the basis of my intimate knowledge of objects illustrated by Willoughby (1935, Fig. 31) in the R. S. Peabody Foundation, Andover, and the Peabody Museum, Harvard University, I am prepared to state categorically that they bear no significant resemblance to these Sarqaq points with tapered stems. Superficial resemblances between these small and carefully made points and the Archaic points to which Dr. Ritchie refers can only be found in inadequate illustrations of each. There is, in truth, no similarity whatsoever among these implements.

If we may summarize the foregoing, we find that a hypothetical "Eskimo-like" occupation of the northeast was postulated to explain striking similarities although inadequate data was available at the time. Next, hypothesis attained a status approaching dogma. After the recognition of Dorset as a distinct group, the deeply-rooted myth of Eskimoan influence forced the "Dorset Eskimo" to become the hypothetical transmitters or receivers of cultural influences. There ensued an interval when specimens were attributed to the still little-known Dorset, because examples in hand did not correspond to illustrations and descriptions of pieces from known historic or prehistoric Eskimo cultures. Finally, hypotheses and conclusions were drawn on the basis of "Dorset" material which was not excavated under controlled conditions or even by the "principal investigator."

It now seems time to forsake the hypothetical Dorset and cleave to the Dorset defined by Collins, Larsen, Meldgaard, O'Bryan, Rowley, Taylor, and others who have excavated recently under controlled conditions and are, therefore, in a position to know what does and does not belong in the varied expressions of Dorset culture. This inventory has been sufficiently defined by these writers and needs no further statement.

In a recent paper (1959) I used the term "Boreal Archaic" to distinguish Archaic remains found characteristically in northeastern North America as opposed to Archaic remains of the southeast and the coastal plain. This term was used with malice aforethought in order to make room for two aspects

which were then apparent in the northeast—Maritime Boreal Archaic and Laurentian Boreal Archaic (Byers, 1959, p. 255). Similarities between this eastern material and other aspects in southern Alaska and the Northwest Coast have long been recognized. Furthermore, similarities to Old World specimens have for years provoked conjectures regarding circumboreal cultural contacts (Gjessing, 1944, 1948; Spaulding, 1946). Boreal Archaic culture finds expression in a diversity of aspects, from Atlantic Maritime and Laurentian to Pacific Maritime with its two presently recognized sub-centers in the Fraser delta and southern Alaska. Further light on the development of the Fraser delta center will undoubtedly be cast by Borden's work in progress at DjRi 3, in the Fraser Canyon, British Columbia. The Old Copper culture of the Great Lakes basin shows so many parallels in form and nature of implements that it must qualify as still another aspect in spite of the fact that copper, rather than slate or bone, was favored as a material for spears and other tools. Other expressions of Boreal Archaic will undoubtedly be recognized with expanding knowledge of regions now archaeologically poorly known.

Dates for Boreal Archaic complexes are few and widely scattered. No radiocarbon date as yet applies to any archaeological site in Labrador, Newfoundland, or the Maritime Provinces. Two dates from Ellsworth Falls, Maine, place a Boreal Archaic culture there about 4,000 years ago: M-89, 3959 ± 310 B.P., and the stratigraphically and chronologically later M-90, 3350 ± 400 B.P. (Byers and Hadlock, 1955).

According to Ritchie (1951a, p. 48) the Laurentian phase is dated by the Oberlander No. 2 component C-192 (2948 ± 170 B.P.) and by Frontenac Island, the frequently cited C-191 (4930 ± 260 B.P. Arnold and Libby, 1950). In a personal communication, Dr. Ritchie states that the date for the Oberlander No. 2 component "marked the end of the Laurentian Archaic and the beginning of Early Point Peninsula and Early Woodland in central New York." We have thus to consider only the date for Frontenac Island, a date resulting from analysis by the solid carbon method, not considered as precise as proportional gas counting. Dates of other samples from Frontenac Island, excavated in 1953, were determined by proportional gas counting. These are Y-459, 3970 ± 80 B.P. (Deevey *et al.*, 1959) and W-545, 3680 ± 250 B.P. (Rubin and Alexander, 1960). Sample C-191 was from a hearth which "directly overlay and partly destroyed what appeared to have been an extended burial, a Laurentian characteristic, suggesting that both features may pertain to the early Lamoka-Laurentian contact . . ." (Ritchie, 1951b, p. 130). Sample W-545 was from a "hearth at a depth of 20.5 inches," while Y-459 was "from a hearth immediately overlying bedrock." All three samples appear to have come from hearths resting on bedrock although the new samples sound stratigraphically older than C-191. There was little depth of soil in the deposit and therefore judgement on this point must be reserved; Frontenac Island was severely disturbed by the aborigines. It is evident that these new analyses place the occupation of the site at about 4,000 years ago, instead of close to 5,000. The Yale sample lies just beyond the standard deviation of 250 years for the USGS sample. The upper range of 1-sigma on Y-459 overlaps the lower range of 1-sigma on W-545. These two dates appear to be reasonably consistent.

The Bannerman site, with an age of 4480 ± 300 B.P. (M-287, Crane and Griffin, 1958b) appears to be roughly 500 years older than these dates for

Frontenac Island, but it is dated by a single sample from a hearth the position of which appears somewhat equivocal in terms of the artifact inventory (Ritchie, 1958). Ritchie has observed that 58 per cent of the slender Lamoka-like points found at the site were in the lower stratum, and 100 per cent of Early Woodland forms were in the upper, while "... Laurentian forms, on the other hand, were evenly distributed throughout." (1958, p. 68).

Westward from the Laurentian province lie sites of the Old Copper culture. Similarities between Old Copper implements and slate forms have long been noted, but the great antiquity indicated by radiocarbon dates for the Oconto Site— 7510 ± 600 B.P. (C-837 and 839) and 5600 ± 600 B.P. (C-836, Libby, 1955)—have been a barrier to attempts to connect Old Copper and eastern cultures. The analyses which produced these dates were made by the solid carbon method in 1953-4. Now, happily, dates for a number of Old Copper sites in Michigan and Wisconsin have been determined by the proportional gas counting method. Dates for aboriginal mines on Isle Royale obtained from samples of wood taken from the workings, are 3800 ± 500 B.P. (M-371e) and 3000 ± 350 B.P. (M-320, Crane, 1956). Cemeteries dated by analyses of bone include the Osceola site, 3450 ± 250 B.P. (M-643), the Reigh site, 3660 ± 250 B.P. (M-644, Crane and Griffin, 1959), and the Riverside Cemetery, 3040 ± 300 B.P. (M-658, Crane and Griffin, 1958b). The sites may represent the last stages of Old Copper, which Quimby (1954) and Quimby and Spaulding (1957) believe to antedate the Nipissing Great Lakes. However, the Nipissing stage appears to be older than the dates here cited (cf. S-24, 4650 ± 200 B.P., McCallum and Dyck, 1960; Y-238, 4880 ± 190 B.P., Preston *et al.*, 1955). Although the dates are more recent than the new dates for Frontenac Island, they are in keeping with observed archaeological resemblances. Since bone samples were used for dating, it is inevitable that validity of these dates will be questioned.

Turning now to the Pacific Coast, we look in vain for any such antiquity. Kachemak Bay I is dated at 2706 ± 118 B.P. (P-139, Rainey and Ralph, 1959). Although polished slate blades were being made at this time the material was not common. De Laguna (1934) found that the use of slate and the occurrence of forms paralleling those of the Atlantic Maritime phase of Boreal Archaic was most frequent in Kachemak Bay II and III. The latter period falls within the Christian era at 1369 ± 102 B.P. (P-138, Rainey and Ralph, 1959). Dates for Fraser delta sites have been given by Borden; here and on the accompanying chart (Fig. 1) they are given in radiocarbon years B.P.—Whalen I, 2450 ± 160 (S-18, McCallum and Dyck, 1960); Locarno Beach, 2430 ± 160 (S-3, McCallum, 1955); and Marpole, 2350 ± 60 (S-17bis) and 1780 ± 60 (S-93, McCallum and Dyck, 1960). The date for Locarno Beach was obtained by the solid carbon method, but it is backed up by a re-run of S-3 by gas counting, 2270 ± 100 and by S-62, 2270 ± 160 , the date for a comparable site at Hope, British Columbia (McCallum and Dyck, 1960). A date for Marpole (S-17, 1950 ± 125), previously determined by the solid carbon method, has been discarded. S-17bis is a second run from the same sample, by proportional gas counting.

A glance at Fig. 1 will show that while pre-Dorset dates are, in general, older than those for sites on the Fraser delta and Alaska, Dorset itself is only slightly older on the basis of P-213, but overlaps the entire range of Pacific dates presently known. On the other hand, pre-Dorset dates fall within the

span covered by gas-counted dates for the other Boreal Archaic aspects—Atlantic Maritime, Laurentian, and Old Copper. Only one Dorset date, P-213, and the standard deviation of another, P-76, overlap the youngest limit of one sigma for the same dates. On the basis of present knowledge, any postulated direct cultural connection between the Dorset Eskimos and Boreal Archaic cultures of the northern United States and adjacent Canada appears anachronistic.

If the Dorset of Foxe Basin and the Gulf of Boothia is to trace its parentage to Atlantic Maritime or Laurentian Boreal Archaic it behooves someone to find strong family resemblances in pre-Dorset sites or lose by default. Until reliable data are forthcoming from Labrador and Newfoundland to prove forest connections for Canadian Dorset, I believe that a verdict of "not proven" must be returned.

Stray traits scattered among Dorset and Indian sites include multiple side-notching, of which a few examples occur in Maine and eastern Canada, and also in Danger Cave, Level III; side notches "cut square" and placed well up the side of the point, which are also found very sparsely scattered in eastern Canada and Maine, and in Aztalan and Cahokia; and asymmetrical knives, which are common in Maine and the Maritime Provinces, but lack the features which distinguish such knives in eastern Dorset collections. The Cody knife (Wormington, 1957) which has been found northward into Alberta and Saskatchewan should not be forgotten in the scramble, for its offspring may appear as offset or crooked end knives (Harp, 1962).

Side-notched points are sometimes considered a link with eastern Archaic sites, but side-notching appears in western North America as well as at the Modoc Rock Shelter in considerable numbers for 6,000 years or more, and in Old Copper and related manifestations. Tapering-stemmed points are also cited in evidence of a link between Eskimo and Indian, but we should remember that tapering stems characterize the points from Gypsum Cave, Lind Coulee, and other early horizons in the west as well as Archaic horizons in the east. Stems, straight, tapered, and side-notched, have been known in North America for so many years that they could easily become public property.

Stone lamps from pre-Dorset sites are rounded (Meldgaard, 1962) and in this respect reflect the general shape of steatite pots from Archaic sites in eastern North America. Lug handles were common on the Archaic vessels. While stone vessels have been found over much of North America, the excavated pieces from New England, of which I am aware, are from sites which show other evidence of influence from south of the region. Ritchie rejects any connection between Archaic and arctic stone vessels, and with this I agree.

Polished slate appears suddenly in early Dorset. Meldgaard (1962) indicates that it does not persist until his Dorset III. Taylor informs me (personal communication) that slate blades occur throughout the Dorset sequence in Ungava, although apparently in declining frequency. The Dorset slate points are very small when compared with slate points from Boreal Archaic sites (see Pl. 2). They do, however, show features in common. One of these is the facettled form, another, the method of making the notch, for the notch is not chipped out, but appears to have been produced by rubbing. The notch "flows" smoothly around the stem of some specimens. A third feature shared with "Indian cultures" is multiple notching of such points, found widely in

Boreal Archaic, and on Old Copper variants. These notches occur in most exuberant form in the "Eskimo-like" points of New York State (Parker, 1920). They also appear on Boreal Archaic slate points from the Maritime Provinces, on a point from the Nevin Shell Heap (Pl. 2, *F*), and on a point from Frontenac Island (Ritchie, 1944, Pl. 148, 20). Ritchie (1962) illustrates several. Bayonet slate points of the Moorehead complex may preserve vestiges of these notches. Outlines of several slate points, including some from Taylor's Toonoo and Sima sites are shown in my Pl. 2. On the basis of photographs, I judge that there are no exact counterparts from sites in Alaska and British Columbia.

Connections between Pacific aspects and Great Lakes and Atlantic aspects may eventually be found somewhere west of the Great Lakes and Hudson Bay. At the same time it should be remembered that perishable bone may have taken the place of imperishable stone. Ritchie (1949, Fig. 4, *aa*) and de Laguna (1956, Pl. 40, 5) have illustrated bone specimens which reproduce substantially the form of polished slate points. Similar substitutions may account for gaps in the distribution of polished slate.

We have also to remember that the land between Hudson Bay and the Cordillera has not always been as it is today. Several lines of evidence suggest that grassland formerly occupied territory now covered by the forest through which eastern Boreal Archaic traits are supposed to have traveled (Spaulding, 1946; and others). Evidence for this former belt of grassland is largely botanical (Byers, 1946, pp. 29-31 summarizes it). The archaeological evidence is meager but includes MacNeish's (1958) Whiteshell Focus in southeastern Manitoba. These people lived chiefly on *Bison bison*, although a barbed antler point suggests that fish may also have graced their board. Tentatively, the site is dated at 3,000-5,000 years ago. Recent discoveries have extended the northern limit of distribution of types of points ordinarily associated with a grassland economy into the Northwest Territories (Wormington, 1957; MacNeish, 1959b, p. 12; Harp, 1962).

J. Bryan Bird (1959) points out tremendous changes in elevation of the land which have occurred in northwestern Canada in postglacial time. He suggests that a long arm of the sea may have covered the Mackenzie Lowland as far as Great Slave Lake or even Great Bear Lake, and that proglacial lakes or arms of the sea existed over many parts of this as yet poorly known area. He cites Raup as authority for a statement that strand lines at elevations of about 1,100 feet can be found in the vicinity of Great Slave Lake. Raup also pointed out the recency of forest growth there. In this same area archaeological radio-carbon dates on MacNeish's (1962) Yuma tradition run to 5,000 years ago. We should remember that the route by which Boreal Archaic traits were transmitted to eastern people may have been a strand line far from the modern one and from modern routes of travel. It may be difficult to discover.

Traits assumed to be of northern origin did not necessarily travel together. The semilunar knife outran double-edged slate knives and spears into regions which had been under deciduous forest for at least a millennium before such knives were used. A case could be made for development of such a knife by increasing refinement of spall scrapers and knives, already widely known from northern North America (Harp, 1962; MacNeish, 1962; Byers, 1959). Dorset Eskimo apparently remained unaffected by either stimuli or contact with people who used semilunar knives.

To date we do not have sufficient data regarding the placement in time or cultural context of points with rubbed notches. If any point such as those shown in Ritchie's Pl. 2, *b, g* (1962) has been excavated under circumstances which place it definitely, it has escaped my attention. That from the Nevin Shell Heap lay in soil disturbed by the digging of Grave 1, which may belong to one of the later occupations of the site. We cannot be sure of its original associations. Potsherds found near the points on East Sugar Island (Ritchie, 1962, Pl. 2, *a, d*) suggest that if aboriginal mixing of the deposit did not occur, they may have persisted in use as part of a Point Peninsula complex (Ritchie, 1949, p. 4). Since similar pottery is associated with late occupation of the Nevin site, this possibility should not be overlooked. Should this association prove valid, the possibility of the contemporaneous transmission of "rubbed notch" points to Dorset and non-Dorset peoples would be greater.

Barbed, "bayonet", and notched-stemmed slate spears and knives may be associated with later Boreal Archaic complexes only. These overlap in time the Dorset sites on the 22-meter beach at Alarnerk, (P-213) and pre-Dorset sites on the 44- and 24-meter beaches at Kapuivik (P-210 and P-211). It is therefore possible that Dorset and eastern Boreal Archaic people received the stimulus to make such slate points at about the same time, but the evidence is in no respect conclusive, nor is the means of transmittal clear.

Meldgaard (1962) has called attention to what he calls a survival of the "fluting technique" in triangular end blades from Labrador and Newfoundland. This varies in many respects from the technique used on eastern fluted points (Witthoft, 1952; Byers, 1954). Survival of Paleo-Indian work habits may be evidenced by scrapers with spurs at the end of the working edge, long, carefully made, trianguloid end scrapers with sharply ridged cross-section, and the re-touching of every conceivable form of chip to make a working edge. The last two, and the "feel" of Paleo-Indian, is especially pronounced in Taylor's pre-Dorset collections, now at Ottawa. Although no Paleo-Indian sites are known north of the Reagan site or east of Bull Brook, a fluted point in the United States National Museum (149925) comes from Intervale, New Hampshire, and one in the National Museum of Canada (VIII-D-58) comes from Quaco Head, just east of St. John, New Brunswick. One pointed Enterline side scraper (similar to Witthoft, 1952, Pl. 2, 13; Byers, 1954, Fig. 22, *i* extreme left) from the north shore of the St. Lawrence was shown to me. The possibility of a survival of Paleo-Indian traditions and work habits into comparatively recent times cannot be discounted.

Chance resemblances between Dorset and "Indian" cultures may be due to common sharing of widely distributed traits included in the ancestry of Dorset; this ancestry may include both plains and eastern Paleo-Indian. The Arctic Small-Tool tradition seems to be dominant, and to give Dorset its salient characteristics. Polished slate implements, derived from some as yet unidentified donor, reached both Dorset I and Boreal Archaic peoples. It is my conviction that neither group transmitted directly to the other.

Regional variations of Dorset may reasonably be expected, since Dorset spread over thousands of miles of coastline with great differences in environment. Only careful excavation in Labrador and Newfoundland will dissipate the cloud which presently obscures the relationship between Dorset and Boreal Archaic in the eastern Arctic.

A DISCUSSION OF PREHISTORIC SIMILARITIES AND CONNECTIONS BETWEEN THE ARCTIC AND TEMPERATE ZONES OF NORTH AMERICA

James B. Griffin

My participation in this symposium is as a commentator on the interpretations presented here by the arctic archaeologists and on the connections of their materials with the prehistoric complexes of the area south of the Canadian border. As I have tried to keep aware of the developments in the arctic area I have been impressed by the failure of the archaeologists in that area to produce a cultural complex which is helpful in interpreting the early materials in the United States territory, and to the south. At the meeting in New Haven I recommended a vote of censure to be given to the assembled arctic excavators for their stubborn persistence in digging up late cultural complexes.

The Plano complexes

The complex or tradition of post-fluted blade hunters which moved into the western Canadian area along with the bison, as the grasslands moved north, has been called the "Yuma" tradition by MacNeish (1962). The term "Yuma" has, however, fallen into disrepute among most of the Plains archaeologists. Plains Archaic has been proposed and used by some writers, but the term I like best is "Plano", which was suggested by Edwards and Jennings (1948) some years ago to refer to the primarily hunting economies of the Plains area, including a number of named projectile forms from Plainview to Agate Basin and beyond, which are almost certainly connected to the fluted blades of the earlier hunters in the same area. The Plano tradition, or long-lived culture complex, may be said to begin with the passing out of style of the Folsom point about 8000 B.C. and appears to last until approximately 4000 to 3000 B.C. There is little excuse now to include these Plano hunters in a Paleo-Indian group as was done when the cultural position and temporal range of "Yuma" and Folsom forms was not well known. The Plano points are not "Paleo" even if they were "Indian". The most extreme extension of Paleo-Indian toward the present was probably made at the Pecos Conference some years ago, when the paper presenting the split twig figurines of 1000 B.C. was placed in the session on Paleo-Indian complexes. It is primarily southwestern archaeologists who have tended to perpetuate this mistake. If one must speak of Paleo-Indian it should be as a time period and it could reasonably end about 8000 B.C. The fluted blade hunters are a distinctive complex or tradition in this Paleo-Indian time period. There are some scattered evidences of the fluted points in Alaska, but so far none have appeared in Canada in the area north of approximately central Alberta, where

they should be. Some of the Alaskan points called fluted are not very close to the forms in the United States.

The terminological difficulties which Harp refers to in his paper (1962¹), when comparing his Keewatin points to Agate Basin, might be avoided if the comparison is made to a general Plano-point tradition which has many named "types". In any event, there is unusual agreement among archaeologists that there was a northern expansion up the Canadian corridor of Plano hunters, and that these people, or this tradition, came to dominate the Mackenzie area, the tundra-forest zone of the north-central Arctic, and also spread west into northern Alaska. It did not spread into the Canadian area east and north of the Great Lakes, presumably because of glacial conditions from 8000 to 5000 B.C., or for other ecological reasons. The absence of this complex in the area mentioned is one of the more important facets of arctic archaeology. The radiocarbon and comparative dating of the western Canadian Plano tradition clearly indicates it to be a marginal northern extension and further, that it is dominant in the area of western and northwestern Canada until about 2000 B.C. It will be noted that Irving, who is familiar with both the arctic area and the Plains, believes that what I am calling the Plano tradition is too "complex and diffuse" to be called by that term or any other single term. From my point of view, however, the Plains hunters from 8000 to 2000 B.C. maintained a basically similar cultural adaptation which was in striking contrast to the woodland-forest and basin and range cultures which occurred to the east and west of them during the same time period.

On the other hand it is not unreasonable to view the Northwest Microblade and Arctic Small-Tool traditions of MacNeish and Irving, respectively, as being an interior forest development for the first, and a tundra coastal development for the second—both divisions of an essentially similar flint-working technology. Their basic relationship is at least as important as their recognized differences. They cannot possibly be regarded as indigenous American arctic developments even though each was modified in this hemisphere.

Irving (1962) has commented on the post-war discoveries of a variety of pre-ceramic complexes in Japan, their relationship to the Alaskan area, and their differences from the Baikal-Lena sequence. It is difficult to conceive of the Japanese area having had an independent development of core and blade industries. These must surely have been diffused or carried by groups from the mainland and are ultimately to be connected to the Upper Paleolithic of southwest Asia and southeastern Europe. The known Baikal-Lena Advanced Paleolithic sequence does not lead directly into the ceramic levels there, and the core, blade, and burins associated with ceramics, and triangular and stemmed arrowpoints represent a blend, probably from a number of different areas. There should be earlier microlithic industries than Serovo, to the south and east of Baikal, which can be linked to the Mongolia to Japan continuum on one hand and to Alaska on the other.

Arctic notched forms and late Archaic forms

One of the more interesting developments of the recent past in arctic archaeology has been the recognition of a complex, or complexes of notched

¹All 1962 dates refer to papers in this volume.

points distributed over a considerable area. From his Cape Krusenstern beach sequence, and on a neighboring upland site, Giddings has recognized (1962) two distinct associations. At beach 53 he found projectile points with very shallow side notches occupying the lower fifth or sixth of the length of the short point. His upland Palisades complex has a variety of short stubby points, some of which are side-notched, but others might be described as a short broad stem point. From the ground edges, patination, and lime encrustation plus the location of the Palisades site on a 500-foot high terrace, and the absence of Palisades points in the beach sequence, Giddings has postulated that the Palisades complex has considerable antiquity while at the same time pointing out its similarity to the Tuktu complex (J. M. Campbell, 1961b), to the Kamut complex of the Dismal Lake area (Harp, 1958), and to the recent Sadlermiut sites of Southampton Island. To these comparisons may also be added Phases 2 and 3 of the central Barren Grounds (Harp, 1962).

The relationship of Palisades to Tuktu certainly seems valid and Campbell has suggested that Tuktu was the fourth complex to appear in the Anaktuvuk Pass area, following the Natvakruak assemblage which he calls an inland Denbigh representative. The relationship of the Palisades points to MacNeish's Firth River sequence does not seem as close, on the basis of the points he has illustrated (MacNeish, 1956a, Pls. III-V; 1959a, Pl. IV), except for a general smallness of form common to both. The Kamut complex of Harp has, I think, points which are closer to the Krusenstern form than to Palisades, and Harp (1958) compares Kamut with the N. T. Docks, Spence River, and Lockhart River particularly. These complexes are placed by MacNeish (1951; 1954; 1956b) between 2000 and 1000 B.C., and this assignment was aided, or determined, by a C-14 date of 1500 B.C.

In my reprint of MacNeish's initial publication on the Spence River site (MacNeish, 1953) I had made, some years ago, the notation "Old Copper complex?" primarily because of the shallow side-notched projectiles. There have been a number of difficulties in assessing the age and connections of the Old Copper complex because relatively few sites have been excavated, because of a considerable time range of the copper implements, and also because of regional variation within this late Archaic culture. Wittry's (1959b) recent publications on four Wisconsin rock shelters has presented the Durst Stemmed projectiles as a significant part of the late Old Copper culture content in the south-central part of the state. The Durst Stemmed points are suggestive, in form, of both Palisades and Tuktu and of varieties published by MacNeish and Harp. In general, and eventually perhaps more specifically, one can recognize in some of the New York "Laurentian" sites the form pattern known as Durst Stemmed. Farther to the west similar forms are known from about 1500 to 500 B.C. in southern Manitoba and Saskatchewan.

The discussion above has been developing the proposition that the recently recognized notched points in the arctic and subarctic area from Alaska to Hudson Bay are related to forms in the northern part of the United States during the late Archaic and that further, the more likely direction for the diffusion to have taken place is from south of the border to the north. Most of the evidence presented, and the opinion of most of the contributors to the arctic literature, is that the notched forms in the Arctic are not much earlier than 1500 B.C., and that the majority of them are significantly later. I do not recall

these forms, at all, from the Asian literature nor have the several contributors referred to that area in their discussions.

The large side-notched and basally notched forms of Campbell's Natvakruak complex (1962), which he places earlier than Tuktu, are like some of the extreme forms of Raddatz side-notched of Wisconsin which is in a late Archaic complex of about 3500 to 2000 B.C. (Wittry, 1959b). The broad side-notching on large projectiles with a straight to markedly concave base is known in the Upper Mississippi and adjoining Missouri valley during this general time period. They have an earlier origin farther south where they develop during the early Archaic.

It may be doubted that the large stemmed point from Kamut Lake, which Harp (1958, Fig. 7, 3 and p. 241) refers to as Scottsbluff, is really closely allied with that type. Instead, it more closely resembles a style or type of late Archaic from the central Mississippi valley. The distribution of this form, however, should not be assumed to be limited to this area. The adjoining broken large stemmed form on the same illustration by Harp, has a rounded convex base which is close in shape to that which immediately precedes the development of Adena and becomes a dominant style in Adena. The correlations suggested for these forms have the virtue of being on approximately the correct time level to go along with the physiographic location of Kamut Lake and the chronological position of the broad, small side-notched projectile forms.

Old Copper culture chronology and connections

Quimby's paper (1962) tells, initially, of the diffusion of the idea of copper implements from the Upper Great Lakes to the Copper Eskimo and with that concept we can have some sympathy. His summary, however, presents a different idea of connection and it is the summary that I propose to discuss.

The early Chicago dates (C-837 and 839) at 5550 B.C. and C-836 at 3695 B.C., I regard as much too early in time for the Old Copper culture. They are from a single Old Copper site, and there is little reason on the archaeological evidence gathered from the Oconto site, to suspect either a time span of about 1,900 years for its occupation, or, on the basis of comparative typology, that either date is correct. Furthermore, the Oconto site is at an elevation of about 600 feet above sea level and was under the waters of Lake Nipissing. I believe the site was occupied during the stand of Lake Michigan at the Algoma level and that the date should be between 1500 to 1000 B.C.

I have read the original reports of the Fort William, Ontario finds mentioned by Quimby (1962), and they do not give me a feeling of confidence of the Nipissing or earlier age of the specimens. I would suggest people read the account in Tanton (1931, pp. 83-4). The normal position for the copper specimens was in the upper three to four feet. I suggest that the specimens 40 feet deep fell to that position during commercial excavation. The Pic River gaff hook reference is one of my library finds with its presumed pre-Nipissing interpretation. This interpretation is, however, not the only one, as Hough (1958, pp. 257-9) carefully pointed out, and Dr. William Farrand, who specifically investigated the find spot, is skeptical that the hook could have been overlaid by Nipissing deposits. On the other hand, there is reason to believe that some Old Copper culture may be dated to immediately before the rise to the Nipissing level. The Nipissing level is thought to be in the neighborhood

of 2500 to 2100 B.C., so that if the Old Copper culture does go back to 3000 B.C., and there is no sound evidence for this yet, specimens could still be under Nipissing deposits but they would not indicate the antiquity suggested by Quimby.

While it is true that the following series of late dates: Reigh site, 1700 B.C. (M-644), Osceola site, 1500 B.C. (M-643) (Crane and Griffin, 1959), and Riverside Cemetery, Menominee, 1080 B.C. (M-658, Crane and Griffin, 1958b) were made on bone specimens, the dating was done on the organic carbon and I believe the dates are not far off the mark. The cultural material from these sites does not suggest an earlier time position. The Raddatz rock shelter has a date of 3240 B.C. (M-813) (Crane and Griffin, 1960) for late Archaic side-notched projectile forms and is regarded as Old Copper without the copper. It may also be *before* the development of copper tools. This date was made on charcoal. Also on charcoal are three dates from a copper pit on Isle Royale which run from 1800 B.C. to about 1000 B.C. (Crane, 1956, pp. 668-9); I do not believe this copper was being supplied to any group other than the Old Copper culture. The cross-dating on Old Copper forms and associated projectile forms indicates that Old Copper is contemporary with New York Laurentian from roughly 2400 B.C. to about 1000 B.C.

Quimby would have the Old Copper culture disappear by about 1000 B.C., and this is a good round date for it, even though some of the artifact types continue into later cultures. The greatest spread of specifically Old Copper types, however, should occur during the period when they were being made, and both the beach lines and bottom land of Lake Agassiz were available during this period. The period of maximum warmth is said to be between 3000 to 2000 B.C. in the Upper Great Lakes and Old Copper is primarily after and not before this period. It is a mistake to think of the post-8000 B.C. climatic trend as a straight line shift from colder to warmer, because there is considerable evidence to indicate minor shifts of relative cold and warmth both before and after the altithermal-hypsithermal. A. C. Spaulding's site at Menominee, for example, which has a C-14 date of 1000 B.C. (A. C. Spaulding, personal communication) represents a warm phase of the post-Nipissing climatic fluctuations.

The northward movement of the forest that Quimby is apparently talking about, takes place before and during the growth of Old Copper. His idea of a movement of people, must mean that they hibernated in the north woods for some thousands of years without producing any known material culture, suddenly to awaken, pass over their styles to grateful Eskimos at Coronation Gulf and then silently slip back into the forest. An alternative hypothesis would be that many of the artifact types of the hunters and fishers of the Coronation Gulf were quite similar to those in the Upper Great Lakes. These artifact types were translated into copper forms in both areas when the native metals were recognized as suitable for tools. Quimby should really espouse the idea of Old Copper lasting as late as he possibly can in order to avoid a considerable time gap between it and the appearance of the Copper Eskimo culture.

Pre-Dorset and Great Lakes relations

It is at once apparent, as Ritchie has said (1962), that the culture complexes of the central and eastern Arctic in the period from 2000 B.C. on to the historic present are markedly different, and even strange, to an archaeologist

who has worked with north-central and northeastern United States material. The eastern spread of the Arctic Small-Tool tradition, primarily adapted to tundra and tundra coastal hunting and fishing, did not penetrate as a complex through the boreal forest zone. The resemblances which he has pointed out and the direction of flow from south to north during his Laurentian phase of the late Archaic may be correct. The peoples of the forest zone in Lower Canada and northeastern United States are known to have developed their late Archaic complexes with an emphasis on ground and polished stone tools and with a wide variety of stemmed and notched projectile points before these appear in the eastern Arctic.

On the other hand, I am intrigued with the appearance in the eastern Arctic of the triangular projectile form, which may either be a harpoon end blade or an arrowpoint as Meldgaard (1962) has suggested. In any event, this form has come from the western Arctic, and, in turn, I assume from the northeastern Siberian "Neolithic". If there are northward extensions from late Archaic complexes of the northeast to the eastern Arctic, is not the appearance of the triangular point in the northeast the result of its introduction from the eastern Arctic and perhaps with a new technique of propelling it? The rather sudden appearance and strength of the triangular point is spread from Wisconsin to New England in the southeast along the Appalachians, but does not become common in the Ohio and Mississippi valley until post-Hopewell times.

Another postulated introduction from the Arctic Small-Tool tradition as, (or rather after), it spread into the eastern Arctic, would be the varieties of core and blade manufacture which are a prominent feature of the Hopewellian flint-working complex. This is a diagnostic feature of Hopewell and does not appear before Hopewell in the Upper Mississippi valley. None of the early Woodland or late Archaic sites have it. The other possible source for the Hopewell cores and blades is, as a part of the traits indicating contact with meso-America, the other major area of core and blade production. The time period of 400 to 200 B.C. for the appearance of the forms in Hopewell is such that it could have come from either direction. The sudden appearance of micro-flints and cores in Poverty Point by 700 to 500 B.C., along with many characteristics of that site, is a puzzling phenomenon. On the present dating, Poverty Point precedes Hopewell, and geographically is midway between Hopewell and Mexico, but the details of the Poverty Point specimens are not, I suspect, particularly close to the Hopewellian products or to Mexican types. If the Hopewell core and blade is a northern introduction, the rest of the arctic complex did not accompany it, nor is the known distributional pattern in the western Great Lakes and to the north suggestive of a southern spread from the tundra. The Hopewell core and blade seems to spread to the north and north-east from Ohio and Illinois during the expansion of Hopewell rather than having come in from that direction. It must be admitted that the source for Hopewell blade production is not clear.

The western and eastern ground stone forms

In Borden's paper (1962), he emphasizes the appearance of ground stone forms in his Marpole and Locarno Beach phases which, in round numbers, can be dated between 1000 B.C. and A.D. 1. The similarity of form of some of his ulu, knife, and dart heads to eastern Old Copper and boreal forest forms is clear

enough, but the meaning of the similarities is less clear. Borden can successfully dispose of the Paleo-Eskimo and Eskimo as the source for this complex, but can he or anyone else identify these forms in the American Arctic or northeastern Asiatic Arctic to account for their appearance either in the Northwest Coast or in the Great Lakes-St. Lawrence area?

In an effort to connect Marpole-Locarno Beach with the Lena valley, Borden has spoken of the Baikal-Lena "Neolithic" cultures and their ground stone forms which I do not see as sufficiently close, in form, to those in north-central North America to require any direct connection. The Baikal-Lena forms are inextricably bound up with a ceramic complex whose introduction into Alaska and northwest Canada is already documented about 1000 to 200 B.C., and where the ground stone forms are significantly absent. It is also known that pottery does not appear during the Marpole-Locarno Beach phases and it does not appear with the ground slate-copper-polished stone forms in the northeastern United States which, as we have seen, may be dated from 3000 to 1000 B.C.

It is also clear, from radiocarbon dating, that the eastern emphasis on ground and polished stone forms goes back to at least 4000 B.C. in the Ohio valley and southeast. At present, the spread of these techniques in the east is best regarded as from that area to the north. This even includes the cylindrical drilling of the bannerstones, a technique which has interesting similarities to the drilling of the shaft hole battle-axe forms of Europe and Asia. It appears to be earlier in North America than in Europe.

I cannot, at this time, accept the evidence which would indicate direct connections between the Northwest Coast development of ground stone forms and those of the east, even though the temporal position in the east suggests the possibility of east to west diffusion or population spread. In theory, this could have been done through the forest area of Minnesota and Manitoba to a point where the prairie corridor would have been easily bridged. We do not, however, have sites or materials from the western part of the boreal forest or the northern Plains which would support such a theory.

Ceramic connections between the Arctic and temperate North America

One of the perennial problems of eastern United States archaeology has been the origin of pottery which, in the past, was either attributed to Mexico, from which it had spread along with maize agriculture, or from northeast Asia. Within the last twenty years it has become increasingly probable that Woodland pottery, as a ceramic tradition, is indeed derived from northeast Asia by way of the Bering Strait area. It moved from there to the northeast Yukon where, at the moment, as far as we know, the trait stops. The pottery that Giddings and others have obtained at Iyatayet, Choris, and other sites is clearly derived from the Middle and Lower Lena where it was a fusion of Baikal and primarily north Chinese ceramic styles, which merged in the Middle Lena valley. Since the linear and check stamp in north China do not seem to have developed until very late Painted Pottery and just before Shang times, I believe that the Middle and Lower Lena pottery complex, ancestral to early Alaskan types, does not appear until after 1500 B.C. The Norton complex (Griffin, 1953; 1960) of linear and check stamp must be sometime after the Lena assemblage, and the earliest appearance in Alaska is guess-dated along with Giddings's

chronology at about 1000 B.C. Incidentally, I owe Giddings particularly, and the rest of the arctic archaeologists, an apology for attributing a cloth-impressed sherd to the Choris complex (Griffin, 1960, p. 10 and footnote 5) when it actually came from Iyatayet. The mistake was due to my carelessness.

With a little breadth of view we can regard Choris pottery as an earlier phase of Norton and this is the earliest *known* western Alaskan pottery. I have personally examined some, but admittedly not very many, of the pottery fragments from Engigstciak, on the Firth River. I assume that these were MacNeish's best specimens. His early pottery in form, temper, paste, and other features is an eastern relative of Norton but with a wider variety of decorative techniques. I have not seen any cord-marked sherds made with cords like those of the eastern United States, or like those from China or Japan. There is no cord-marked in the Norton complex and very little in the Lena valley. MacNeish does have dentate stamp which is rare or absent in Norton. Dentate stamp is known in the Lena valley where it is probably derived ultimately from western Siberia; or, as another suggestion, MacNeish's Buckland Hills dentate might be connected with "Neolithic" Japan and Hokkaido. This proposal is without any support from a known diffusion toward the Chukchi Peninsula. I am a little puzzled as to the temporal or cultural significance of MacNeish's Firth River, Buckland Hills, Joe Creek, and Cliff phases (1962). I suspect there is relatively little time difference between the phases, and that some site areas with a high concentration of one type of surface finish may represent the product of a single family or group who only had one paddle in operation.

Now, what is the temporal position of these phases on MacNeish's (1959b) chart? They spread from 2000 B.C. for Firth River to 200 B.C. for the Cliff phase. I do not understand how Firth can reasonably be earlier than the Norton complex which may go back to 1000 B.C. for its earliest (Choris) phase. I suspect that MacNeish may have been influenced here by a C-14 date on carbon black which Ritchie obtained from an early Point Peninsula site. Some of the pottery from the Red Lake site of northern New York is reasonably but not securely tied to the burial complex (Ritchie, 1955, p. 50). Vinette I is the earliest type of Woodland pottery in the northeast, but the date at Red Lake is at least 1,000 and maybe, 1,500 years earlier than we can be certain there was pottery in the Upper St. Lawrence. The culture complex of which Point Peninsula I is a local representative (it should never have been called that, but instead No-Point Peninsula) appears at the end of the late Archaic and becomes an integral part of early Woodland. It is spread with regional variation from Maine and Long Island to at least the Mississippi, between the Ohio and the Great Lakes. It is securely dated by a number of radiocarbon dates to the period about 1000 B.C. give or take 500 years. None of the material at Red Lake should date as early as 2500 B.C. Early Woodland women, about 1000 B.C., may have been making some of the early thick Woodland pottery called Fayette Thick in the Ohio valley, where it was first named, or Vinette I, or Marion Thick in the middle west, but they were remiss about putting it with the dead. This widespread early Woodland pottery is a distinctive ware, which is not found in northwest Canada, Alaska, or, as far as I have been able to tell, anywhere in the Old World. It may be suspected that it is unique to the area where it is found, just as the fiber-tempered pottery of the southeast is unique. The fiber-tempered pottery is earlier, up to 2000 B.C., than certainly dated

Woodland pottery. Some eastern archaeologists are toying with the idea of an independent invention of pottery.

If the above argument is true, then we cannot derive, directly, early northern Woodland pottery from the arctic area, and must fall back on the rather neat footwork of stimulus diffusion from an unknown earlier ceramic level in the arctic area of North America and Asia. This level should include cord-marking and the use of the paddle. In Michigan we know that late Archaic Old Copper people were making cordage, mats, and perhaps woven, plaited, and twined items from the preservation of the vegetal material associated with copper. Perhaps the application of cord to the paddle, and of fabric farther south, is not the result of direct transmission from the Old World but of the spread of knowledge of a technique of building, finishing, and firing pottery in which local simple techniques have produced a false impression of direct spread. The fabric-impressed pottery of the middle south *is not* found in the northeast and Great Lakes, *is not* in early levels in Alaska, and I have not seen it illustrated from northeast Asia. I also doubt that southeastern simple stamping, check stamping, or complicated stamping is directly derived from Alaskan and Canadian material because these surface finishes do not appear north of the Kentucky hills until a time, and in a context, which indicates they are being moved from south to north.

The dentate stamp of Firth River may be the source for Point Peninsula II, (genuine Point Peninsula, that is), and for the appearance of the early dentate in immediately pre- and early Hopewell levels in Illinois, but we are not certain of this, and if MacNeish's date of 2000 B.C. is right, where were the dentate-stamp people hiding until about 500 to 300 B.C., when this technique appears in the States? We must also keep in mind an earlier appearance of the dentate stamp in meso-America and farther south, but that is another puzzle.

As an hypothesis, for which there is little evidence in favor and perhaps a great deal in opposition, I will propose that proto-Athabaskans are responsible for the introduction of pottery and its spread into Alaska and northern Canada, and for the contact which spread pottery into the Algonkian-Iroquoian Great Lakes area. This is based on the following hypotheses. The Athabaskans are the latest "Indian" language stock to cross the Bering Strait before the beginnings of the development of Eskimo culture. The Athabaskan language stock is perhaps most frequently mentioned as having linguistic relatives in eastern Siberia. The Athabaskans are said to be "more Mongoloid" than some other peoples of different and older (?) linguistic stocks to the east and south. Their Asiatic origins should be found in the area of interior hunters and not sea mammal hunters. The last major cultural impulse from interior Siberia before the development of Okvik-Old Bering Sea-Birnirk is the introduction of pottery which appears to have arrived as a carried complex and not diffused. Later culture movements from west to east in the Arctic are clearly Eskimo and the Athabaskans must surely have already reached their northern homes before this time.

Conclusions

The net result of the discussions which are included in this paper, and in the views expressed by the major participants, is that there is very little indication of the spread of prehistoric culture from the Arctic into temperate

North America. From the time of fluted blade hunters to the historic period, the dominant flow or spread of cultural elements has been from south to north. There are no prehistoric complexes from the western Plains to the Atlantic which can be traced, as complexes, back through the American Arctic into northeast Asia. It is also difficult to demonstrate the route or routes of movement of such traditions as Woodland pottery, not to mention other items thought, by some, to be a part of a circumboreal complex. No eastern Archaic complex is a new migration from Asia. The heightened burial ceremonialism of 1000 B.C. does not come in with migrating people from north and west of the Great Lakes, and neither does Woodland culture nor any of its subdivisions appear as the result of "Men out of Asia" marching merrily through forests and boating across lakes and streams into the northern United States. The spread of culture, stemming from north to south and vice versa between the temperate zones and the Arctic, is seen as primarily an exchange of some useful tools and concepts but is not to be compared with the spread of culture from meso-America to the north. The above comments should not be construed as opening a North Atlantic passage for the spread of Solutrean or Woodland pottery from Europe.

INTEMPERATE REFLECTIONS ON ARCTIC AND SUBARCTIC ARCHAEOLOGY

Frederica de Laguna

Twenty years ago I was asked to contribute a paper on "The importance of the Eskimo in northeastern archaeology" to a symposium in honor of Frank G. Speck (Johnson, ed., 1946b).¹ This was an assignment into which I threw myself with considerably more abandon and self-confidence than I now feel in accepting the editor's invitation to comment on the meaty symposium papers in this volume. My previous venture has had the distinction of considerable bibliographic citation, but, it must be admitted, almost invariably for the purpose of refuting its conclusions. My calculation as to the antiquity of the Laurentian was too short by at least 3,000 years according to present C-14 dating, and this error was important in leading to a "wrong-way Corrigan" hypothesis that the Dorset Eskimo had taught the Archaic Indians a whole bagful of tricks for very little in return. Popular opinion would now either reverse the direction of Indian-Eskimo teaching, or make both parties the protégés of a hypothetical fairy godfather dispensing favors from the vicinity of the Great Lakes (Old Copper culture?), or in some unspecified way recognize both as co-heirs to a more remote and more mysterious ancient boreal tradition. However, Griffin's tough-minded analysis in this volume indicates that these theories are not yet proven, either. As far as I know, no one has seriously tried to explain away *all* of the relevant Eskimo-Indian similarities by invoking coincidence, that is, by postulating independent parallel or convergent developments, which probably did occur in some cases, nor has any one seriously questioned that there were similarities to be explained.

But in admitting that I climbed out on what subsequently proved to be a rotten chronological limb, I should also remind those who read only the most up-to-the-minute contributions that I was not alone on this perch, though a bit farther out than my companions.² We were not rash. Rather, by placing the Laurentian and Dorset well within the Christian era, we were reacting judiciously to the daring mistake of a previous generation which had dated the Basket-makers too far back in time, an error exposed by dendrochronology. Dr. Libby's atomic bomb was, however, to reveal the hazards of our supposedly safe conservatism, and precipitated a hasty retreat of archaeologists into the

¹Note that the symposium was held in 1941, but publication was delayed by the war, and my paper was printed as read.

²Ritchie then dated Lamoka between A.D. 300(?) and 850, and Laurentian between A.D. 700 and 1050. See his table in de Laguna (1947, p. 17).

shelter of the remote past where that ultra-radical, Diamond Jenness, had been waiting all along (Jenness, 1940).

If there is a moral in this it is to beware of the latest and most popular assumptions of science, for the very fact of their being in style may prevent us from seeing more reasonable but less fashionable possibilities. We have to be willing to follow an original hunch and risk being mistaken in order to have a chance to be right. At the same time, we should try to be aware of the nature of the data and of the assumptions on which our calculated risks are based.

On looking back at my own essay of 1941, I can see now where some of my methodology and some of my assumptions were ill-advised. Thus, my thinking was still cast in the framework of an ancient, basic circumpolar cultural tradition, of which the Eskimos, rather than any Indians, were supposed to be the purest exponents. And even though I was trying to break up this "Ice-hunting tradition" into several strands to accommodate known diversities and had repudiated the hypothesis of an "original common Eskimo pattern," there still lingered an unconscious bias in favor of great Eskimo antiquity. The very problem of "The importance of the Eskimo" in the development of northeastern cultures was bound to prejudice the answer by asking too specific a question. I should have been content to discover and plot similarities in northeastern Indian and Eskimo contexts without attempting to explain their origin and history. Unfortunately, these explanations have served to obscure the importance of other similarities which I cited in Dorset (my "Dorset" included traits of what is now called "Sarqaq"), in Okvik-Old Bering Sea, in Kachemak Bay I, in early Aleutian horizons, etc., resemblances that hint at ancient east-west Eskimo links, or even at the possibility of more remote connections between American and Asiatic North Pacific cultures. These peculiar similarities still need to be squarely faced and eventually accounted for in our theories of arctic and subarctic culture history. Incidentally, Byers (1962¹) seems over-sanguine in expressing the opinion that we now know what is and what is not Dorset. Collins and Meldgaard certainly do not see completely eye to eye on this point, and the latter exaggerates, I believe, the difference between Sarqaq and Dorset. While I may be too lost in the woods to see the important trees, I fail to detect any of that forest aroma which Meldgaard smells in Dorset culture.

It is obvious now that what I was attempting in 1941 was a *tour de force*, a free-wheeling extrapolation of possibilities, and that my real mistake was not in advancing an untenable hypothesis, but in failing to make clear, to myself as much as to others, that the emerging conclusions were really not conclusions, but only tentative questions or problems for further study.

What prompts me to this discussion of ancient history is the discovery that, despite the wonderful advances in northern archaeology, some of the same mistakes in methodology which I committed or against which I inveighed are still being committed in the articles in this volume. The authors may well be correct in their deductions; but, if so, they evidently have the necessary skill and nerve to skim safely over thin ice without testing each yard, or else they are lucky. I shall, however, take upon myself the Cassandra-like prerogative of waving a few red danger flags.

The first of these possible dangers lies in placing too great faith in our new gadget, radiocarbon dating. Like the television set for the baby-sitter,

¹All 1962 dates refer to papers in this volume.

this device has made itself so indispensable to the archaeologist that few can resist the almost hypnotic effects of its numerical pronouncements. Despite the fact that the laboratory clearly labels these dates as having only a certain degree of probability within a certain range of years, the very fact that probability and improbability are expressed in mathematical terms makes us all the more ready to believe that we hear the pontifical voice of Exact Science enunciating chronological certitude. However, when what we have every right to consider as approximately contemporaneous materials, or know to be samples from the same hearth, give us conflicting dates when processed by different laboratories or by different methods,¹ then our faith should be tempered with rational skepticism. Moreover, the high priests of the laboratory cannot even guess at the probable extent of error due to contamination which the sample may have suffered in the ground, or in our hands before they receive it. An unsupported radiocarbon date, obtained from an object excavated long ago under forgotten field conditions, and that has since languished on some dusty shelf, may be no more accurate than the old-fashioned guess date.

The hypothesis (see Borden, 1962 and Byers, 1962) of a slow south-to-north diffusion of ground slate blades depends largely on the accuracy of the relative dating of the Marpole-Locarno Beach phases in southern British Columbia on the one hand and of prehistoric Pacific Eskimo cultures on the other. Thus, for the Fraser River and the Gulf of Georgia sites Borden mentions a series of C-14 dates from 943 B.C. to A.D. 179 (omitting the usual "plus or minus"), and hazards that these slate-using cultures were already established well back in the second millennium B.C. Byers gives dates running back only to about 490 B.C. $\pm$ 160 years. Both authors seem ready to accept the dates published by Rainey and Ralph (1959)² for my Pacific Eskimo materials excavated in 1931 to 1933, even though there were only five dates in all, of which three for one site were from samples suspected of contamination. The single date for Kachemak Bay I, 748 B.C. $\pm$ 118 years, was obtained by combining eight pieces of antler from the lowest level of the large sub-beach site on Yukon Island. The single date for Kachemak Bay III, A.D. 489 $\pm$ 102 years, came from five pieces of antler "from the period III level of the Yukon Island site." (Presumably this was the same submerged site, although there was another midden on the island in which the third period layers were not below high tide level.) In fairness to those who use these dates, I should point out that all of the great midden on, or rather *under*, the beach at Yukon Island lies below high tide level so that it is saturated with salt water, and that we also had to wash our specimens in sea water. Most of the bone and antler material from this site was so spongy that we soaked it in a dilute solution of shellac and wood alcohol to strengthen it. To what extent this may have contaminated the samples for dating purposes, I am not competent to judge. However, if we accept a date of about 1068 B.C. $\pm$ 280 years for a hearth well above the bottom of Laughlin's Chaluka site in the Aleutians, throwing in a few extra centuries to accommodate the first occupation, and if we are not afraid to argue by analogies and extrapolations, we may claim Kachemak Bay I as still older, since the Chaluka material gives every appearance of being more evolved (de Laguna, 1956). (I was formerly doubtful of Chaluka's claim to antiquity, and most modest in

¹See for example, Haury, *et al.* (1959) and Wendorf and Krieger (1959).

²All Eskimo dates cited here are quoted from this source.

dating the Kachemak Bay sequences, but since I have been proved too conservative in the east, I may be equally wrong in the west, and guilty of mistaking millennia for centuries).

Other arctic dates published by Rainey and Ralph (1959) may be cited to suggest that the Kachemak Bay materials are older than their C-14 ratings. Thus, the Norton or Near-Ipiutak-like collection from Cape Denbigh, which suggests affinities with Kachemak Bay II or sub-III, has yielded five solid carbon dates averaging 403 B.C. $\pm$ 170 years, and one carbon dioxide date of 225 B.C. $\pm$ 110 years, suggesting that all estimates for Kachemak Bay may be too recent. This conclusion could also be argued by reference to the Norton-like culture of the Choris site near Kotzebue, which has three dates ranging from 688 B.C. $\pm$ 117 years to 286 B.C. $\pm$ 113 years. All this implies that if Kachemak Bay II or sub-III were roughly contemporary with Choris or Norton, then we should drag Kachemak Bay III back from A.D. 500 or 600 much closer to the Birth of Christ.

This inference would also gain some support from the dates obtained from a house post which I excavated at the bottom of a Chugach Eskimo midden in Prince William Sound. It should be stressed, however, that Chugach culture is not identical with that found in Kachemak Bay, and that I was only guessing when I estimated that its earliest known remains did not antedate Kachemak Bay III or sub-III. The house post which gave dates of A.D. 205 and 231, both $\pm$ 105 years, had been coated with parafin as a preservative. A piece of wooden shovel, undoubtedly contemporary, registered a date of 303 B.C. $\pm$ 112, but was rejected as contaminated by parafin. No doubt the thin blade was more deeply impregnated by parafin than the solid post, but both pieces were found in a post hole in the sour swampy soil, or peat, that underlay the midden, and were below the level of high tide (de Laguna, 1956). Lastly, all my specimens had been accumulating dust for a good quarter century before they were tested for radiocarbon, so all of these possible sources of contamination should be considered in using these dates, as well as all the dangers of extrapolation in attempting to question them.

Still, these Pacific Eskimo dates seem to me to be too close to those from southern British Columbia to justify great faith in any one-way diffusion theory. Moreover, the scanty collection from Kachemak Bay I, which came from one small area of 160 to 200 square feet, is hardly big enough to indicate the full range of the cultural inventory, still less, what was absent from it. We know that stone flaking was then well developed because we found many chipped implements and waste flakes, but we are arguing from negative evidence if we claim that grinding of slate was just then being introduced from the south. Perhaps this is what actually happened, but the hypothesis rests on shaky foundations. However, these doubts do not mean that I favor the opposite thesis that the basis of Northwest Coast culture was Eskimo. The question is not a simple one of Eskimo versus southern British Columbia Indians (Wakashan?), for we still have to reckon with the probability that there were other groups, like the Eyak, on the northern Northwest Coast in ancient days.

It is always easy (and correct) to say that the data are not adequate, that we need more carefully controlled excavations, more specimens from stratified and dated sites. Of course, materials so obtained are better than the surface collections or objects of uncertain pedigree with which we may have to work,

but this is not, I believe, the crucial point. For there will never be enough data to satisfy us, and furthermore, the data will never be more significant than the questions we ask of them. Understanding seems to grow more through learning to ask the right questions of the available materials than through the sheer amassing of more data of which misleading or irrelevant questions may be asked. There is no substitute for the insight that can tell what problems are capable of solution, or rather, that can suggest how critical questions can be rephrased to permit intelligible answers. Speculative insights and fruitful interpretations are possible on all levels of information, provided one knows what the data are good for, and this cannot be ascertained until one has experimented with them. But conversely, no amount of data is sufficient in itself to generate spontaneous understanding or provide wise conclusions.

The latitude or flexibility of the taxonomic framework employed determines the appropriateness of the conceptual scheme into which both questions and answers must be fitted. Here I would suggest that the classic dichotomy between "inland" and "coastal" forms of Eskimo culture has become more of a hindrance than a help. We know a good deal more about types of environment and forms of cultural adjustment to them than are implied by these simple categories. Borden's article (1962) indicates how much progress has been made in the archaeology of the Salish area since the old "inland" versus "coastal" theme has been abandoned. Again, the terms "Paleo-Eskimo" and "Neo-Eskimo" are confusing, because they reflect now largely outmoded theories about the origin and development of Eskimo culture, implying not only the "inland-coastal" distinctions for ways of life that were not so one-sided, but also, of course, because they imply a temporal sequence as well. As a result, different chronological stages of the same local cultural growth may be classified separately, while other cultural manifestations are given the same label even though they are neither obviously related nor contemporaneous. Besides, now that we have found the arctic or subarctic equivalents of "Paleo-Indian" industries (even though Griffin would use the latter term in a more restricted sense), still these arctic "Archaic", North Pole "microlithic", tundra "Plano", frozen "Yumoid", etc., do represent one or more possible sources for subsequent Eskimo cultures, so that it becomes doubly confusing to call any of the latter "Paleo-Eskimo".

Some of the recently coined classifications, such as "Arctic Small-Tool Tradition" and "Northwest Interior Microblade Tradition" are undoubtedly still useful, although they apparently mean different things to different writers. Thus, although Irving (1962) explains that "A tradition . . . is an aggregate of type complexes", persisting through time and found in different cultures, and that a single culture may share more than one "tradition", yet it is difficult to avoid using these terms to classify whole cultures. And when MacNeish (1962a) specifies that a tradition is "a complex of tools that persisted, with few changes, through both time and space and which seems to represent a *specific way of life*" (my italics), he is, in fact, classifying cultural wholes. This may be quite justified, although the diagnostic criteria are limited. It is potentially as dangerous a method as that of classifying whole cultures on the basis of the pottery that women made in their spare time. These "traditions", if we are not careful, may eventually rigidify into taxonomic polarities of Forest versus Barren Ground, similar to "Paleo-" versus "Neo-Eskimo".

I would still repeat the cautions voiced in 1941 (de Laguna, 1946) against a too complacent reliance upon formally defined "types", treated as if they were each fixed and independent entities, capable of precise enumeration, or of statistical manipulation in the form of "trait lists" and "seriation tables". These mathematical expressions are not infallible guides to cultural or chronological relationships. Nor can the latter be adequately expressed in the form of a "family tree". For the cultural phenomena with which we have to deal are not biological species, strung out along separate evolutionary lines that can never cross-fertilize each other, and the relationships between men's creations are not "genetic". Rather, we handle the material embodiments of human dreams and fads, the results of men's notions of how to make things and of their abilities to carry out their ideas. While we can never directly know the ideas themselves, we must remember that axes and harpoon heads and pots bring us into indirect contact with the complex and kaleidoscopic conceptual world of their makers, and that these creations reflect the inspirations, copyings, cross-stimulations, inventions, embroideries, and ennuis of that world of ideas. We are not the kind of scientist who works best with narrowly defined terms and rigid taxonomies; we need more fluid, open-ended (and long-winded!) descriptive phrases that can deal with styles as well as with the more formal attributes of dimension, weight, and chemical composition.

Arctic and subarctic archaeology has evidently been suffering from a rash of taxonomic measles. Each newly recognized form of an artifact has been designated by a new term, whether that be the pseudo-Linnaean double-decker ("Kilimatavik closed socket" for a harpoon head), or the bastard Athabaskan "tci-tho" (for a plain split cobblestone scraper). And every handful of material collected at a different campsite apparently represents a new industry, culture, or complex, to be heralded, if possible, by a long, not too easily pronounced or remembered, native name ("Engigstciak", "Taltheilei", "Natvakruak", or "Kachemak"). From these one may get the impression that some remote areas, for example Anaktuvuk Pass, were as busy with arrivals and departures as Grand Central Station in the rush hour. Of course, we do have to be able to express significant cultural distinctions, but surely this does not have to be done in terms that obscure cultural continuities. In fact, what impresses me about the papers in this volume is the wealth of material carefully and skilfully gathered, yet described or designated in such esoteric jargon that only the active lodge members of the inner circle can really understand one another.

And there is also a moral here. For Chard (1960d, p. 121), in reviewing recent texts in general anthropology, has found that while the authors pay lip-service to the importance of archaeology, they have, in fact, usually included "either a cursory outline—5% to 10% of the text. . . or a third-hand compilation prone to error and lacking the requisite enthusiasm for the subject matter." But is not this as much the fault of archaeologists as of the authors? For if the specialists in one area are content to address themselves to each other in their secret trade language so that their archaeological colleagues in other areas have difficulty in following them, the common or garden anthropologist cannot be expected to cope with the problem of offering an adequate presentation of archaeology. And if I have huffed a few hot air platitudes or taken a few malicious digs at friends and respected colleagues, I hope that they will take this only in the spirit of good, clean, dirt archaeology.

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