Ancient Man in a Cold Climate: Eskimo Origins

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Those northernmost of men, the Eskimos, beside providing the raw material for generations of nursery stories and bawdy limericks, have long been the subject of more than incidental scientific curiosity. A part of this abiding interest was born of necessity when, in the extensive explorations of arctic coasts and seas which began with the "rediscovery" of Greenland in the 16th century, civilized man faced the urgent question of how the rude Eskimos, dwelling there on the very rim of the earth, managed to survive, while in the same place Europeans, possessed of meat and beans and coal stoves, starved and froze to death by the shipload.

Necessity, however, was not the only reason. A different concern had to do with who the Eskimos were and where they had come from, and this interest was to emerge as a major historical problem when it was eventually learned that, although Eskimo territory extended continuously for an enormous distance (from Alaska south of the Aleutian Islands to the northeastern coast of Siberia, and east across the top of America to the far side of Greenland), the scattered Eskimo tribes shared a surprisingly large number of physical and cultural traits.

Although it was not until the spring of 1910 that the last unknown Eskimo tribe was encountered by Vilhjalmur Stefansson on the ice of Coronation Gulf off north central Canada, the basic similarities of distant groups were recognized much earlier, and the more we learned about them the more apparent it became that there was an essential homogeneity among all Eskimos, and that, at the same time, they did not seem to be closely related to anyone else. Physically they were clearly Mongoloids, but Mongoloids of a specific type, differing in notable ways from their neighbors on the Siberian mainland and from the American Indians. Their language was even more distinctive, having no discernable linguistic relatives in any direction; with respect to the rest of their culture, a constellation of both intellectual and material traits—for example, toggle-headed harpoons, side-bladed knives and weapon heads, and specific shamanistic practices—gave to nearly all of them a peculiar stamp that seemed to be Eskimo and nothing else.

Thus were posed the questions of the origins and identity of the Eskimos, questions not yet resolved in any final way, but **The Archeology of Cape Denbigh** (Brown University Press, Providence, R.I., 1964. 346 pp. Plates. $12.50), by J. L. Giddings, is a highly consequential milestone on the road to the answers. It reports, for the first time in detail, on three prehistoric cultures whose remains were discovered on the Alaskan coast of the Bering Sea in the summer of 1948 and excavated by Giddings and his associates during that and three subsequent seasons.

The book has a number of worthy characteristics. For instance, Giddings has enough of an ecological bias to keep the reader informed about past and present occurrence in the region of various natural resources, and about the exploitation of both nearby and distant environments, as such resources are reflected in the artifactual remains. In other words, he draws pictures of what it is like, of what one needs, to live on a frozen coast. Further, in the case of "Nukleet," the most recent of the three cultures described, and the one that yielded the greatest number and variety of artifacts, the author describes and summarizes according to categories of implement use: Land Hunting, Community, Food Preparation, and Household are among the topics treated. This is not a new technique, but it is a very good one where it can be applied, and again, it allows the reader to see Eskimo life, as well as to view its inventory. The book is also enhanced by the participation, in one way or another, of several experts (including a physical anthropologist and a Pleistocene geologist), each of whom contributed analyses and interpretations of materials recovered or encountered in the sites. There are other notable characteristics, but that which for some time to come will be of first interest to every archeologist who reads this book is the section entitled "The Denbigh Flint Complex."

Among other things the discovery of Denbigh speaks for the relatively rapid acquisition, by the archeological world, of a knowledge of arctic prehistory. Despite several centuries of conjecture regarding the racial and cultural roots of the Eskimos, archeology, the most obviously suited tool for tracing their origins, was just about ignored until a few decades ago. Indeed, in the American Arctic the first digging that was to have any direct bearing on the problem was that by Stefansson at Point Barrow, Alaska, in the summer of 1912. In the intervening 52 years, however, archeologists have excavated ancient encampments scattered the length of Eskimo territory. The work has produced a substantial body of literature, a good portion of it theoretical, which is marked by a few particularly important contributions to an understanding of Eskimo genesis. Against this context of known and postulated culture history, Giddings' descriptive and interpretive account of the Denbigh artifacts looms as one of the most important of all.

Among the more durable points of view illuminated by the Cape Denbigh finds is the Central Origin Hypothesis. Ethnographic observations during and before the 1920's led Kaj Birket-Smith, and others, to think that the roots of Eskimo culture lay in the interior of North America, and that at some time in the distant past "Proto-Eskimos" moved out from inland lakes to the central Canadian Arctic, became Eskimos, and subsequently spread east and west along the northern coasts. The hypothesis was essentially based on two suppositions —(i) the assumption that the culture of the modern Caribou Eskimos, who inhabit the Barrens west of Hudson Bay, must be the oldest culture because it is more primitive than that

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of other Eskimos; and (ii) the assumption that, because a specific and widespread method of winter seal hunting is more elaborately developed along the central Canadian arctic coast than elsewhere, it must have originated there.

Kaj Birket-Smith's interpretation, in one or another form, had wide acceptance and was supported by the discovery of prehistoric "Dorset" Eskimo culture, first described in 1925 by Diamond Jenness. Dorset was restricted to the eastern Arctic, and it was old. Dorset proper and the directly ancestral "pre-Dorset" stages have been recently found, by radiocarbon dating, to span the years from about 2000 B.C. to at least A.D. 500. And although it could not be demonstrated that Dorset was in any direct way ancestral to more recent Eskimo stages, the fact that Dorset was ancient, and that most of its sites were concentrated around northern Hudson Bay, lent credence to the Central Origin Hypothesis. Further, certain artifact types in the Dorset inventory (only three or four, as I see it) were like those of prehistoric Indians to the south. Enigmatic, however, were the distinctive and numerous, small, flaked-stone implements in Dorset, particularly points and side blades, and also microblades (small, parallel-sided stone flakes, struck from specially prepared cores). Finally, there were flaked burins (used for graving hard organic substances such as antler or ivory) and, in later Dorset phases, modified burins or burin-like tools, ground on their cutting edges rather than flaked. Neither of the graver types was recognized for what it was until years after the discovery of Dorset, but both were to prove valuable in eventually assigning Dorset origins.

While the Central Origin Hypothesis has been tenacious (it or its progeny are still heard from occasionally), by about 1930 a series of finds, across the Arctic, strongly supported an alternative interpretation. In 1922 Mathiasson discovered the prehistoric "Thule" Eskimo culture in the Hudson Bay area. Thule was found to have developed from "Birnirk" culture, the remains of which had been uncovered by Stefansson's previously noted pioneering work at Point Barrow. Both Thule and Birnirk, in turn, shared many trait similarities with "Punuk" culture, discovered in 1928 on the island of that name in the Bering Sea by Henry B. Collins. And Punuk, in its turn, was derived in large part from "Old Bering Sea" culture, discovered by Diamond Jenness in 1926 on the Diomede Islands in Bering Strait (an early Old Bering Sea stage, "Okvik," was discovered in 1931 on Punuk Island by Otto Geist).

This developmental sequence—from shortly before 200 B.C. to later than A.D. 1000—became of notable theoretical importance for several reasons. First, it can be demonstrated that much of modern Eskimo culture has descended from it. Second, in Okvik-Old Bering Sea there were numerous flaked stone artifacts, among which were small side blades as well as burin-like, edge-ground tools similar to those in Dorset. Further, there were unmistakable parallels between some Old World traits and some traits occurring in Okvik-Old Bering Sea cultures and in Punuk. These Old World parallels thus prompted the argument that Eskimo culture stemmed from the Eurasian Mesolithic and Neolithic, and Collins, the most articulate protagonist of this point of view, suggested specifically the Siberian, Lake Baikal Neolithic, as the "tap root" of Eskimo culture. (Collins, it must be said, did not claim that all Eskimo traits which related to the Old World came directly from the Siberian Neolithic. Also, following publication of the first brief Denbigh report in 1949, he was one of the first to recognize the possible importance of the Denbigh Flint Complex in Eskimo history.)

The third major interpretation of Eskimo origins was that of Helge Larsen and Froelich Rainey, who, accompanied by J. L. Giddings, discovered "Ipiutak" culture at Point Hope, Alaska, in 1939. Ipiutak, an enormous prehistoric Eskimo village, contained among its artifacts a number of strange types, or styles, never before found in North American sites. They included grotesque tools and ornaments made from elaborately carved ivory, beautifully flaked end blades and side blades, and a variety of other forms. Again, a number quite definitely were related to the Old World. Some Ipiutak tools and art styles were like those of the Siberian Iron Age. Others, however, closely resembled types in such prehistoric Eskimo cultures as Okvik-Old Bering Sea, Birnirk, and Thule.

Except for the proposed locale of origin, the Ipiutak Hypothesis roughly paralleled Birket-Smith's inland origin scheme. Pointing out relationships between Ipiutak and metal-age cultures of Siberia, Larsen and Rainey held that Ipiutak originated in a "Proto-Eskimo" base in the northern forest zone of Eurasia, from whence it spread out to the coasts, becoming ancestral in different ways to the various prehistoric and historic Eskimo tribes. Like Birket-Smith, they considered Caribou Eskimo culture to be an inland survivor of the old, inland-oriented (in this instance, Ipiutak) way of life, and they further believed that the modern Nunamiut Eskimos, of interior Alaska, were direct descendants of the Ipiutak people. It is noteworthy that in developing their interpretation they listed close parallels between certain major artifact types of Ipiutak and Dorset, pointing out resemblances in art designs, stone side blades, stone scrapers, adz heads, and other items. On several grounds (and in fairness to Larsen and Rainey, substantially on the basis of subsequent data), their interpretation of Eskimo origins has been roundly criticized, but here it is sufficient to note that the finally determined age of Ipiutak worked most tellingly against them; radiocarbon dates place it between 1 and 500 A.D., younger than Okvik-Old Bering Sea, and considerably younger than Dorset and its immediate progenitors, which brings us back to the Denbigh Flint Complex.

Eskimo tales of legendary encampments on the bluffs of Norton Sound led Giddings and his field party to the ruins of two ancient villages, Nukleet, and Iyatayet. Both of the large sites, perched seven miles apart on the headland known as Cape Denbigh, represented long periods of occupation. Each contained cultural debris to vertical depths of about 7 feet, and Nukleet was the sort of place which frequently puts arctic archeologists to the acid test. From top to bottom it was solidly frozen, requiring that the excavation surfaces be exposed a painful few inches at a time as they thawed in the wet summer air. Giddings' remark that "the trenches became mudholes, determination of stratigraphy became extremely difficult, the sides of the trenches tended to slough, and drainage remained a major problem," precisely describes a singular characteristic of far northern fieldwork. But as a result of the frozen ground, Nukleet proved to be a treasure trove of information. Thousands

of artifacts, including some fashioned from such perishable materials as grass, permitted an excellent view of an Eskimo society which had occupied the site fairly continuously from the 12th to the 18th century A.D.

But it was the Iyatayet site that extended the Eskimo sequence far beyond the boundary of anything previously known. Iyatayet was not as extensively frozen as Nukleet and, further, its stratified levels did not reflect continuous habitation, but rather separate occupations, widely spaced in time, of three ultimately related but quite different societies. Just under the sod lay a relatively thin deposit of Nukleet culture remains. Below this was a layer, ranging to 3 feet in depth, which yielded artifacts and features of a much older Eskimo culture which Giddings calls "Norton." The Norton layer contained, among other artifacts, a variety of flaked stone arrowheads, lance points, side blades, adz blades, and scrapers, and also, interestingly enough, edge-ground modified burins like those in Dorset and in Okvik-Old Bering Sea. A number of Norton implement types have almost their exact counterparts in Ipiutak culture, and since Norton developed about 400 B.C. it can be assumed that it is an early, Ipiutak relative.

Finally, at the very bottom of the Iyatayet site, and separated from the Norton layer by sterile silts, Giddings found hundreds of small, delicately flaked stone artifacts: the tools and weapons of the Denbigh Flint Complex. These remains have a maximum age of at least 5000 years and, while among them there are a few puzzling types that seem to have analogues in very early American hunting cultures, the collection as a whole relates unmistakably to Eurasia. Among Denbigh manufacturing techniques or implement forms, which are known to have originated in the Paleolithic, Mesolithic, or Neolithic of the Old World, the author notes (i) burins, which originated in the Eurasian Upper Paleolithic; (ii) microblades, which are typical of the Eurasian Mesolithic; (iii) fine, bifacial flaking of semilunar, triangular, or lanceolate flints that were hafted in weapon heads and other tools as side blades or points, a technique which originated in the Eurasian Mesolithic and Neolithic; and (iv) particular techniques of removing, from stone cores, oval and parallel-edged flakes that were subsequently fashioned into scrapers and other tools, techniques which originated in the Eurasian Middle Paleolithic.

The roots of the Denbigh Flint Complex, therefore, lie far to the west, but obviously extend to several sources in that area, and the particular constellation of traits which makes up Denbigh—the exquisite workmanship and the forms and varieties of its artifacts—sets it quite apart from any other very old prehistoric culture known from either side of the ocean. Its traits thus appear to reflect a distinctive economic expression, based on an aggregate of diverse cultural ways, and specifically adapted to the natural world of the Bering Sea. They also identify some American relatives of the Denbigh Flint Complex.

Norton, Ipiutak, Dorset, and pre-Dorset contain a range of traits that are also found in Denbigh. In all of them there are types of stone scrapers, end blades, side blades, and other forms which are closely similar to those in Denbigh, and in Dorset and pre-Dorset there are, in addition, microblades and burins. Further, in Dorset, in Norton, and even in Okvik-Old Bering Sea, there occur modified burins, the small, edge-ground gravers. In broader context, these seemingly few traits have, in reality, long been basic to essential portions of the most northerly societies, for they have to do with the edging of weapons, including some types of harpoon heads, the particular forms of certain knives and other cutting tools, the manufacture of implements from hard organic substances, and the preparation of hides for a variety of purposes.

The implications of the age and tool kit of the Denbigh Flint Complex are, therefore, obvious. And this raises my only quarrel with *The Archeology of Cape Denbigh*. A few years ago William N. Irving proposed the so-called Arctic Small Tool Tradition, a valuable concept that illuminates the relationships among a number of far northern archeological components which are genetically connected, and which are eventually basic to modern Eskimo culture. Earliest of its known components is the Denbigh Flint Complex. The Arctic Small Tool Tradition is now generally accepted and widely employed by archeologists, but Giddings does not use it, nor does he mention it, in this book. In view of its common use in the recent arctic literature, this lacuna would seem to deserve an explanation.

As it has moved upward through time, that column which stands for Eskimo culture has expanded and changed in a variety of ways. Some of this metamorphosis has resulted from internal invention and discovery; much more, in all likelihood, has come from borrowing. For example, there are the previously noted Asian elaborations in Okvik-Old Bering Sea, and in Ipiutak, and surely, through the centuries, the Eskimos have adopted some traits from American Indians. But this hardly means that one must beat the woods of either continent in order to find the earliest Eskimos. For, although we shall probably be looking for the ultimate origins of *specific* Eskimo traits until doomsday, Giddings shows us that Eskimo culture seems to have begun on the shores of a far northern sea.

Chemistry

Elements of the Theory of Gases. Sidney Golden. Addison-Wesley, Reading, Mass., 1964. 160 pp. Illus. $5.

Fast Reactions in Solution. E. F. Caldin. Wiley, New York, 1964. xii + 306 pp. Illus. $7.50.

Elements of the Theory of Gases is for "intermediate students of chemistry" and "is concerned with gases and the kinetic-molecular theory which has been developed to account for their properties." The author, Sidney Golden, likes logic for its own sake, and his discussion is systematic and easy to follow. The mathematics used makes only modest demands on the reader. Interesting experimental results on gases are introduced and interpreted in the light of the theory.

The titles of the five chapters are "Properties of uniform gases," "Properties of nonuniform gases," "Kinetic molecular theory of ideal gases," "Molecular distributions," and finally "Nonideal gases." The book is a balanced presentation of the basic parts of kinetic theory. It serves as a good introduction to advanced treatises in kinetic theory as well as to certain aspects of statistical mechanics.

Caldin's book, *Fast Reactions in Solution*, is primarily concerned with experimental methods and some of the interesting experimental results. In chapter 12, the last chapter, he intro-