its inhabitants. Nothing less than this is adequate for a proper appraisal of the natural world and our role as a part of it. This experience should be obtained at the hands of men who believe in it, who have status with their colleagues, and who are in intellectual communication with each other. There is no place for loose ends or superficial business in such an enterprise. Nor can it be carried on without the actual contact with phenomena in laboratory and field. Science that is merely verbalized is dead stuff.

But to this end it is equally essential that the educated individual must acquire such experience in the context of history, the arts, and an understanding of his own species. As a rough objective, I would propose turning out a product aware of what is going on around him in the world of nature and of man, able and willing to relate the present to the past and to the future in both thought and action.

To do this we must recognize with greater frankness than we have that there are vast differences among individuals. Let us learn to look upon these differences with respect, as a source of enrichment rather than discrimination, training each, honoring each, and expecting service from each according to his gifts. Let not the slow impede the fast, nor the fast bewilder and condemn the slow.

With a population set to double in less than half a century, with a national space which, though vast, is finite both in area and quality, with each individual making growing demands, moving faster and further by a factor of at least ten, we have on our hands a problem without precedent in geological history. But if we sense the problem and believe it worth solving, we can solve it.

Our future security may depend less upon priority in exploring outer space than upon our wisdom in managing the space in which we live.

Eskimo Longevity in Northern Alaska

Vilhjalmur Stefansson

Eskimo longevity in pre-white times is at best a matter of informed guessing, for "they took no care to reckon the years as they passed." But in northern Alaska their health, and other factors that bear on longevity, have been under study since 1852, and the records seem trustworthy. Beginning with the 1890's we have statistics resting on birth, baptism, and death certificates made by medical missionaries. Based on these formal documents is the conclusion that the longevity of northern Alaska Eskimos is greatly inferior to ours. By extrapolation, many have concluded that longevities were similarly inferior in the pre-white time. This extrapolation I now propose to scrutinize through the transition stage of Eskimo culture, from the first wintering of white men at Point Barrow in 1852 to the beginning of formal records, say around 1900.

A Recent Opinion

For this review, I take departure from one of the most recent of well-based longevity guesses, that of a doctor who was for 16 years in charge of the Presbyterian medical mission at Barrow, Alaska.

A preliminary year among the Eskimos was spent by Henry W. Greist and by his trained-nurse wife, Mollie Ward Greist, at Cape Prince of Wales on Bering Strait, during the season 1920–1921. In 1921 the Greists took charge of the Barrow mission and hospital, to remain till 1937. Greist died at his Indiana home in 1955, after finishing, but without publishing, a book, "Seventeen Years With the Eskimos." Mrs. Griest has lent me the manuscript and permits me to quote from its chapter XXIV:

"For untold centuries . . . the Eskimo of the far North had solely a carnivorous diet. . . . He was healthy . . . with rosy cheeks, with vigor and brawn. . . . He suffered from neither tuberculosis nor any venereal disease; and had rheumatism, if at all, to a limited degree. Barring accidents, starvation during lean years, or epidemics of unknown character, he lived to a very great age with his teeth intact, but worn to the gums since he used his teeth as a third hand. . . . When starches and sugars were introduced by the whalers and traders he at once began the development of carious teeth, something he never had had previously."

Earliest Observations

Having cited this recent opinion, I turn to the oldest one known to us: "Observations on the western Eskimos and the country they inhabit; from notes taken during two years at Point Barrow by Mr. John Simpson, surgeon R.N., Her Majesty's Discovery Ship *Plover*" (London, 1855).

During the second of his 1852–1854 winterings, Simpson counted 309 persons at the larger of the two villages and estimated the smaller at about three-fourths of this number; this made a total resident population, whom he saw continuously, of about 540. As transients, during the summer boating and winter sledging seasons, he must have seen an additional similar number. He reports, therefore, on about 1000 people for two years.

"These people are by no means the dwarfish race they were formerly supposed to be. . . . [They] are robust, muscular and active, inclining rather to spareness than corpulence. . . . In the young the complexion is comparatively fair, presenting a remarkably healthy appearance . . . before middle life, however, this, from exposure, gives place to a weather-beaten appearance, so that it is difficult to guess their ages. . . . The expression of the countenance is one of

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habitual good-humor. . . . While young, the women are generally well-formed and good-looking.

"The physical constitution of both sexes is strong. . . . Extreme longevity is probably not unknown among them; but as they take no heed to number the years as they pass, they can form no guess of their own ages. . . . Judging altogether from appearance, a man whom I saw in the neighbourhood of Kotzebue Sound could not be less than eighty years of age. He had long been confined to his bed, and appeared quite in his dotage. There was another at Point Barrow whose wrinkled face, silvery hair, toothless gums, and shrunk limbs indicated an age nothing short of seventy-five. This man died in the month of April, 1853. . . . There is another man still alive who is said to be a few years older. . . . In disposition they are good-humored and cheerful, seemingly burdened with no care.

"For tender solicitude with which their own infancy and childhood have been tended, in their treatment of their aged and infirm parents they make a return which redounds to their credit, for they not only give them food and clothing, sharing with them every comfort they possess, but on their longest and most fatiguing journeys make provision for their conveyance. In this way I witnessed among the people of fourteen summer tents and as many boats, one crippled old man, a blind and helpless old woman, two grown-up women with sprained ankles, and one other old invalid, besides children of various ages, carried by their respective families, who had done the same for the two first during many successive summers. . . . Orphaned children are provided for in the same way. . . . We have never heard of the sick and aged being left to perish.

"The age at which women are married is probably in general fifteen or sixteen. They do not commonly bear children before twenty; and there is usually an interval of four years or more between births. . . .

"[By the use of oil-burning stone lamps] not only a good light but a great deal of heat may be produced, so that the temperature of a [winter] hut is seldom below 70°F., and so great a care is taken to keep it trimmed, no offensive degree of smoke arises . . . there is near the middle of the roof a funnel in which a stiff hide is inserted to carry off the vitiated air from the inside of the hut. When the place is too crowded and the temperature too high [a further opening in the roof may be provided]."

Point Barrow Expedition

The *Plover* left its two-year anchorage in the summer of 1854. New England whalers began to pay visits to Barrow that year, no doubt bringing some contagious diseases; but except for these illnesses the people's way of life had not been as yet materially altered by the third decade after Simpson, when the United States Government established the International Polar Station, which was to become the nucleus of what is now Barrow village. The commander was Lieutenant Patrick Henry Ray; but, though his report is excellent, we use here the even more pertinent "Ethnological Results of the Point Barrow Expedition" by John Murdoch, as published in the *Ninth Annual Report of the Bureau of Ethnology* (Washington, D.C., 1892).

On physical characters Murdoch quotes Simpson a good deal, usually with approval. He agrees approximately regarding stature and concurs in the opinion that the Barrow Eskimos "incline rather to spareness than corpulence." He further agrees that "the general expression is good humored and attractive." He says "the males, even when very young, are remarkable for their graceful and dignified carriage. . . . In walking they move with long swinging elastic strides, the toes well turned out and the arms swinging. I can not agree with Dr. Simpson that the turning out of the toes gives 'a certain peculiarity to their gait difficult to describe.' I should say that they walk like well-built athletic white men.

"It was impossible to learn with certainty the age at which women first bear children, from the impossibility to learn the age of individuals in the absence of any fixed method of reckoning time. Dr. Simpson states they do not commonly bear children before the age of twenty, and we certainly saw no mothers who appeared to be younger than this. . . . It is exceedingly difficult, for the reason explained above, to form any estimate of the age to which these people live. . . . Men or women who appeared to be 60 or over were rare. Yuksinga, the so-called chief of Nuwuk [Point Barrow village] [who] was old enough to be a man of considerable influence at the time the *Plover* wintered at Point Barrow (1852–54) was in 1881 a feeble, bowed, tottering old man, very deaf and almost blind, but his mental faculties [were] apparently unimpaired."

Health and Food

Under "Pathology" Murdoch deals with so many things that to follow him all the way would lead us far afield. I quote mainly what might be supposed to have marked bearing on longevity.

"A few cases, one fatal, of hemorrhage of the lungs were observed, which were probably aggravated by the universal habit of inhaling tobacco smoke. [Elsewhere Murdoch explains that the Barrow Eskimos used to get tobacco from China, through Siberia, long before the arrival of the Russians in the 17th century.] Cutaneous diseases are rare. A severe ulcer on the leg, of long standing, was cured by our surgeon . . . and one man had lost the cartilage of his nose and was marked all over the body with hideous scars from what appeared to be scrofulous disease. A single case of tumor on the deltoid muscle was observed. . . ."

Under "Pathology" come, as a digression, remarks on how the Barrow people took care of the infirm. "Dr. Sutherland . . . expresses the opinion that 'an individual in such a state [totally blind] would be quite unfit for the life of toil and hardship to which the hardy Esquimaux are exposed. The neglect consequent on this helpless condition most probably cuts off its afflicted objects.' This seems quite reasonable on *a priori* grounds, but nevertheless the blind man at Cape Smythe had lived to middle age in very comfortable circumstances. . . .

"As a rule, they are quick witted and intelligent. . . . In disposition they are lighthearted and cheerful, not easily cast down by sorrow or misfortune. . . .

"The food of these people consists almost entirely of animal substances. . . . We saw and heard nothing . . . of eating the half-digested contents of the stomach of the reindeer. . . .

"As far as our observations go these people eat little, if any, more fat than civilized man; and, as a rule, not by itself. . . . It is usually supposed, and generally stated in the popular accounts of the Eskimos that it is a physical necessity for them to eat enormous quantities of blubber in order to obtain a sufficient amount of carbon to enable them to maintain their animal heat in the cold climate which they inhabit. A careful comparison, however, of the reports of

actual observers shows that an excessive eating of fat is not the rule. . . .

"We saw this people eat no vegetable substances, though they informed us that the buds of the willow were sometimes eaten [especially in time of famine].

"Of late years they have acquired a fondness for many kinds of civilized food, especially bread of any kind, flour, sugar, and molasses, and some of them are learning to like salt. . . .

"Food is generally cooked. . . . Meat of all kinds is generally boiled . . . and the broth thus made is drunk. . . . Fish are also boiled but are often eaten raw. . . . Meat is sometimes eaten raw frozen. . . . When . . . living in winter houses they . . . have no regular time for meals, but eat whenever [they are] hungry and have leisure. The women seem to keep a supply of cooked food on hand for anyone to eat. . . .

"When a family returns from the hunt . . . they usually keep open house for a day or two. The women of the household, with sometimes the help of a neighbor or two, keep the pot continually boiling, sending in [from the cookhouse] dishes of meat at intervals, while the house is full of guests who stay for a short time, eating, smoking, and chatting, and then retire to make room for others. Messes are sometimes sent out to invalids who cannot come to the feast. They are large eaters, some of them, especially the women, eating all the time when they have plenty; but we never saw them gorge themselves in the manner described by Dr. Kane . . . and other writers."

Murdoch says the Barrow Eskimos are heavy drinkers of cold water. "This great fondness for plenty of cold water has been often noticed among the Eskimos elsewhere. . . . The women tend the lamps with great care . . . the lamp burns with scarcely any smoke and a bright flame the size [length] of which is regulated by kindling more or less of the wick."

Dwellings

Murdoch does not say anything (that I have found) about how hot the interiors of the Barrow houses were in winter. But he gives the right impression by his illustration on page 74, which shows a man seated on what the Danes call a "brix"; he is stripped to a loin strip, which is correct. The children are naked. In the afternoon, the temperature would rise from the midday norm of around 70°F (which Simpson gives as the low temperature of the winter house) to 80° and 100° around dinnertime, then dropping to 70° for sleeping.

Contacts with Europeans

On previous contacts with Europeans, such as might be supposed to affect longevity, Murdoch says: "Until the visit of the *Blossom*'s barge in 1826 these people had never seen a white man. . . . [The barge party] landed only at Refuge Inlet, and had but little intercourse with the natives. His visit seemed to have been forgotten by the time of the *Plover*'s stay at Point Barrow, though [Thomas] Simpson [who] found people there early in the morning of August 4 . . . stayed till 1 o'clock in the afternoon. On his return to Point Tangent some of the natives accompanied him . . . where he parted from them August 6, so his whole intercourse with them was confined to less than a week. [This was the Dease and Simpson expedition in 1837].

"The next white men who landed at Point Barrow were the party in the *Plover*'s boats . . . and the crew of Mr. Sheldon's yacht, the *Nancy Dawson,* the summer 1849 . . . the crews were ashore a couple of days and did a little trading. The exploring ships *Enterprise* and *Investigator* also had casual meetings [as they passed]. . . ."

After telling of Maguire and Simpson in the *Plover* (1852–1854), Murdoch says: "We found [in 1881] that the elder natives remember Maguire, whom they called 'Magwa,' very well. . . . It was difficult to see the *Plover's* visit had exerted any permanent influence on these people. In fact, Dr. Simpson's account of their habits and customs would serve very well for the present time. . . . Since 1854, when the first whalers came as far north as the Point, there has hardly been a season in which ships have not visited. . . . The chief change resulting from this intercourse with the whites has been the introduction of firearms. . . . They have however adopted very few civilized habits. They have contracted a taste for civilized food, especially hard bread and flour, but this they are unable to obtain for 10 months in the year and they are thus obliged to adhere to their former habits . . . they struck me as an essentially conservative people . . . the one unmitigated evil has been the introduction of spirits. . . .

"The habitual drink is water, which the people consume in great quantities . . . and like to have it very cold. . . . When tramping about in winter they eat large quantities of ice and snow. . . . This great fondness for plenty of cold water has been often noticed among the Eskimo elsewhere. . . ."

"The only narcotic in use among these people is tobacco . . . which has been in use among them from the earliest time. . . . Tobacco is used only for chewing and smoking [not as snuff]. . . . Men and women and even children, though the latter be but 2 or 3 years old and unweaned . . . keep a chew, often of enormous size, constantly in the mouth. . . . The juice is not spit out but swallowed, with the saliva, without producing any sign of nausea. . . . Tobacco is smoked in pipes of peculiar pattern [the so-called opium pipe]."

Home Life

Perhaps because it is ingrained in European thinking that "savages" dominate their women, there are many who claim that the Eskimo male does this. Therefore I quote Murdoch (page 413) on the subject, as it has some bearing on home life and therefore on longevity:

"The women appear to stand on a footing of perfect equality with the men, both in the family and the community. The wife is the constant and trusted companion of the man in everything except the hunt, and her opinion is sought in every bargain or other important undertaking." Here Murdoch has a footnote: "Compare Parry, 2nd voyage, pp. 526, 528. Nordenskiold, vol. I, page 449: The women are 'treated as the equal of the men, and the wife was always consulted by the husband when a more important bargain than usual was to be made.' This statement is applicable, word for word, to the women of Point Barrow.

"Children are nursed until they are 3 or 4 years old, according to what appears to be the universal habit among Eskimos. . . . The child is carried naked on its mother's back under her clothes and held up by the girdle. . . . When she wishes to nurse it she loosens her girdle and slips it around to the breast without bringing it out into the air. . . .

"We never heard of a single case of infanticide; and, indeed, children were so scarce and seemed so highly prized that we never even thought to enquire if infanticide was ever practiced . . . the affection of parents for their children is extreme, and the children seem to be thoroughly worthy of it. They show hardly a trace of fretfulness and petulance so common among civilized children, and though indulged to an extreme extent are remarkably obedient. Cor-

poreal punishment appears to be absolutely unknown, and children are rarely chided or punished in any way. Indeed they seldom deserve it; for, in spite of the freedom which they are allowed, they do not often get into any mischief. . . . The older children take very good care of the smaller ones. . . ." Murdoch here gives many quotations to indicate that his description of the Eskimo way of life in regard to children applies to the whole Eskimo [and Chakchee] world.

I cease quoting Murdoch of 1881–1883, as I did Simpson of 1852–1854, with no precise dating of even one instance of great longevity but with the two students agreeing that some persons looked as if they might be past 60, a very few as if past 70, and one or two as if past 80. This was the nearest to exactness that either thought possible, in view of no one's having counted years, in accordance with native custom.

"Lady McGuire"

But a traveler of three decades later was able to get one approximate dating. Diamond Jenness, eventually anthropologist of the National Museum of Canada but at the time anthropologist of the Canadian Arctic Expedition of 1913–1918, met, on the coast east of Point Barrow, a woman whom he called "Lady McGuire" because, as a young lady, she had been aboard the *Blossom,* in 1852. The charming *Dawn in Alaska* [University of Minnesota Press, 1957] has in its pages several memorable characters, whom Jenness came to know as he sledged back and forth along the coast between Point Barrow and the Canadian boundary during the season 1913–1914; of these, none is more endearing than this octogenarian. Under the title "Lady McGuire," she appears several times, the last time on page 129:

"The old lady was extra gay that evening, and with good reason; for shortly after we arrived one of her granddaughters, whom she had not seen for six months, entered the house unheralded, accompanied by her ten-year-old son. Eskimos seldom display their affection outwardly, although they are as devoted to their family as we are; but . . . not one of them would have criticized this octogenarian grandmother [for her boisterous affection]."

In reply to my letter on his over-80 estimate, Jenness said that Lady McGuire might not have been more than 75 in 1914 but that, to him, she was in the octogenarian category, implying that she might have been past 80. When he and I last saw her, in both instances early in 1914, Lady McGuire seemed, at least to me, as if she might have had many years ahead of her.

Informed Guesses

So, in effect, we have all the informed guessers agreeing with the first of them, Simpson, that in the Barrow region of northern Alaska, extreme longevity was not unknown in pre-white times or in the transition stage of Europeanization that precedes our regular statistics. There is agreement, too, though we do not go into it here, that many of those who have died young since birth certificates became available have been victims of European-introduced diseases, among them measles, venereal afflictions, and tuberculosis.

Reginald A. Daly, Geologist

The philosophy that guided the scientific thinking of the late Reginald A. Daly was based on two cardinal principles: imaginative thinking and the necessity of synthesis. This philosophy is well expressed in the introduction to his first book, *Igneous Rocks and Their Origin,* published in 1914.

He points out that a fertile imagination, coupled with a training in physical principles, is vital to science. Geology, because it involves thinking about the invisible parts of the earth and epochs long since passed, is peculiarly suited to stimulate the regulated imagination. When, 30 years ago, Daly was teaching the elementary course in physical geology at Harvard, he emphasized that geology should develop the student's "imaginative muscle."

Daly did not hesitate to speculate even when sufficient data were not available. When lecturing or writing on his theory that submarine canyons were cut by mud-laden currents at the bottom of the sea, he always disarmed his potential critics in advance by admitting the theory's highly speculative character and by expressing hope that those carrying on the field investigations would examine critically his theory and those of others.

Daly was a strong advocate of synthesis. In his book of 1914 he said that science was "drowning in facts." He expressed the hope that geology might find its superman, who would show us the building behind the scaffolding of myriad isolated facts. Daly himself came as near as anyone to being that superman. His six books testify to his ability to correlate countless observations into coherent genetic syntheses.

Daly's accomplishments in field geology were great. His early work, in the late 1890's and early 1900's, was done chiefly in New England, although he made one trip to Labrador. His most colossal task, which occupied six field seasons, from 1901 to 1907, was an investigation of the geology along the American-Canadian boundary between the Rocky Mountain front in Alberta and the Pacific Ocean—a rugged, inaccessible region. In the three-volume memoir of the Geological Survey of Canada that resulted from this study, he said: "No geologically-trained assistant was employed in any part of the field. The work was, therefore, slow. Each traverse meant a more or less taxing mountain climb through brush or brulé." After additional field seasons in Canada, his work took him to Hawaii, Samoa, Saint Helena, Ascension Island, and South Africa. His last field work was done in the early 1920's, when he was slightly more than 50 years old. Thereafter he was able to devote much of his time to the writing of books and papers, in which he synthesized the data gathered by others.