

success of Ahtna and Cook Inlet corporations or why the Metlakatla Tsimshians' history led to acceptance of a reservation.

Inevitably the report will draw comparisons with his Mackenzie Valley report. The village hearings were the same but the review was not government-sponsored. It was funded by bingo games and donations, without money for extensive research. While the book deals with social conditions, the focus is less on development: rather it deals with restructuring the 1971 settlement. In presenting his case, Berger relies heavily on the hearing testimony, some federal reports and court decisions, reflecting restricted funding.

Though occasionally some legal terms such as fee simple patent or encumbrance may not be part of most readers' daily vocabulary, this well-written and well-organized report is an important study of native claims in Alaska for laity and specialist — a case study of indigenous people (or the "Fourth World," as he mentions at the end of the book).

Robert J. MacDonald
Coordinator, Senior Citizens' Course
The Arctic Institute of North America
The University of Calgary
Calgary, Alberta, Canada
T2N 1N4

THE ISLAND OF SOUTH GEORGIA. By ROBERT HEADLAND. Cambridge: Cambridge University Press, 1984. £13.95. US\$39.50.

The author of this book was a biological assistant at the British Antarctic Survey station at Grytviken at the time of the Argentine invasion on 3 April 1982 (he had previously served there during 1977-80). He and his companions conducted themselves with courage, dignity and (as far as circumstances allowed) considerable resource when confronted by *force majeure*. They were removed at gunpoint to an Argentine ship bound for Rio Grande, Tierra del Fuego, and eventually repatriated through Uruguay. The unwelcome interlude of three weeks before the island was repossessed by British forces provides the finale to this book, and also presages the end of an era for, as a direct result of the conflict in the South Atlantic, South Georgia ceased to be a Dependency of the Falkland Islands and became, with the South Sandwich Islands, a separate territory by Statutory Instrument of 3 October 1985. It has therefore been a timely occasion to take stock of the history, geology and natural history of the island.

South Georgia was probably first sighted by Antonio de la Roché (Antoine de la Roche), a London merchant of French parentage, in April 1675 when his 350-ton ship (the name of which is not recorded) was blown off course on a trading voyage to Peru. In June 1756 the island was circumnavigated in similar circumstances by the Spanish trading ship *León* on passage from Callao, Peru, to Cadiz. However, its position and extent remained in doubt until the voyage of HMS *Resolution* and *Adventure*, 1772-75, under the command of Captain James Cook, RN, who made the first chart of the island in January 1775 and took possession of it for King George III under the name "Isle of Georgia."

Cook's reports of the abundance of fur seals and elephant seals led to British sealers starting work on the island in 1778, soon to be followed by Americans. By 1791 there were more than 100 vessels engaged in securing seal oil and skins in the Southern Ocean, one vessel alone accounting for 57 000 fur seals in a single season. The story of these early operations and ruthless slaughter for money, which is not for the squeamish, is admirably described by the author, who includes a number of extracts from contemporary accounts. By 1825 the near-extinction of the fur seal had halted the industry, although there was a brief revival of sealing in the 1870s, following a partial recovery of the fur seal population. The later complete protection afforded this species led to the recolonization of its old haunts, which has been one of the great success stories in conservation.

The early sealing operations had been unregulated by any government, but with the introduction of shore-based whaling on the island in

1904 the Falkland Islands government, under the British crown, stepped in by issuing regulations on the new industry in 1905. This led in 1908 to the issue of Letters Patent announcing that the Falkland Islands Dependencies, comprising South Georgia and the South Sandwich Islands, were British possessions. After 1931 shore-based whaling gradually began to decline with the innovation of pelagic whaling, but continued until 1964, when the last whaling station closed down. But British administration on the island has been continuous since 1905, apart from the brief interregnum of the Argentine occupation.

All these aspects of the 20th-century history of the island are extremely well described by the author, who also gives summary accounts of the principal expeditions or investigations that have contributed to our knowledge of the island, including the work of the South Georgia Survey under the leadership of Duncan Carse in four seasons between 1951 and 1957 and of the British Antarctic Survey, which has maintained scientific stations at Grytviken, 1969-82, and on Bird Island in the north since 1972. The events of April 1982 are recounted in detail. Not the least valuable part of the book are the excellent syntheses on physical sciences and natural history in South Georgia. With 250 illustrations (including adequate maps and excellent photographs, many of great archival interest) and a bibliography of about 90 items, the book is likely to remain the standard authority on the island for many years to come.

G. Hattersley-Smith
British Antarctic Survey
Natural Environment Research Council
Madingley Road
Cambridge CB3 0ET
England

VILHJALMUR STEFANSSON AND THE DEVELOPMENT OF ARCTIC TERRESTRIAL SCIENCE. Edited by G. EDGAR FOLK, JR., and MARY ARP FOLK. Iowa City, Iowa: The University of Iowa, 1984. xiii + 239 p. Softbound. US\$15.00.

While a school boy I read Stefansson's books as examples of high adventure. Eventually, some localities became points of reference and his accounts were reread with interest. In his later years he still appeared now and then as a charming and enthusiastic advocate of life in the far north. On the occasion of his hundredth birth-year, it was a pleasure to attend a symposium in his honor. His widow's account of their 20 years together was fascinating. Only after I had been asked to submit a review of the publication did any misgivings come to mind. His history was discussed with individuals who have been working actively in the Arctic. Our university library has a set of his books and related literature; several were secured for perusal. A recent book by Richard J. Diubaldo (1978) was found to be critical, to say the least. It seems that our explorer-author appears no better under close scrutiny than others who have achieved notoriety. He is still a hero to most of us.

During the early 1900s a portion of the Canadian Arctic was considered to be unexplored. The mystery concerning Sir John Franklin's elaborately conceived expedition of the 1840s had created further interest. Nansen, Sverdrup, Amundsen, and Peary all carried out important exploration. Within a few years, Vilhjalmur Stefansson came to personify small-scale effort in learning about the region. His book *My Life with the Eskimo* did much to establish him as an authority. His years of travel in the North were described exuberantly in various publications and lectures. A popular account, *The Friendly Arctic*, expressed many of his thoughts concerning this region and its inhabitants. Some aspects were controversial and not all matters were seen to reflect favorably upon the author. Nevertheless Stefansson has been recognized as one of the foremost arctic explorers, who had a great aptitude for living there and learning from the native people. Observations concerning diet stimulated research that is still active.

In essence, 30 years after his strenuous field activity, Stefansson was a respected scholar and arctic authority. Some of his visions concerning

high latitudes had been found to be justified. The University of North Dakota, where he went to school, the University of Iowa, where he earned a degree, and Harvard University, where he had held a scholarship, all had welcomed him belatedly. Many honors were bestowed. Dartmouth had developed an interest in polar research when he presented a lecture series in 1947-48. The school then proceeded to assimilate the library he had compiled, his only personal property of consequence. The collection on various aspects of the polar regions totaled about 70 000 items when he joined the faculty there in 1953.

Ed and Mary Folk have studied physiology of mammals native to the Pt. Barrow area. Appropriately, they initiated a symposium honoring Stefansson as an explorer and scientist in the centennial year of his birth. Their base of operations at the University of Iowa, his alma mater, sponsored the gathering. The occasion involved unveiling of a bronze bust by Emanuel Otto Hahn and a statement in tribute by the sculptor's daughter. Evelyn Stefansson Nef, his widow, reviewed the explorer-author's personal life. A greater portion of the published volume involved a series of articles on "The Development of Arctic Terrestrial Science."

In Part I, Chapter 6, of the Symposium, Col. Robert Latimer made an effort to fix Stefansson's place in arctic exploration, "A Historic Perspective." His discoveries may appear modest in comparison with others. Capt. James Cook, best known for his travels during the 1700s in the southern hemisphere, had also mapped the Newfoundland-Labrador coast and sailed along the north coast of Alaska. Dr. James Rae, one of the earliest to adopt Eskimo hunting methods, covered a wide area and brought back evidence of the Franklin Expedition. Nansen and Sverdrup, in the *Fram*, really identified much of the deep polar ocean basin and explored parts of the eastern archipelago. Roald Amundsen, lost while on a rescue mission in 1928, can be recognized for accomplishments at both poles. He was one of the first to explore extensively by air. Stefansson anticipated occupation of drifting ice islands by the Soviets, 1937 and 1941, and the U.S., 1952-70. Additionally he proposed access by submarine, such as that by Wilkins in 1931, and served as a consultant prior to the voyages of *Nautilus* and *Skate* under the ice. Commander James Calvert sent a letter post-marked the North Pole in 1958. Stefansson's advocacy of trans-polar flights to utilize the advantage of a great-circle route was recognized by Scandinavian Air Lines and others.

To his credit, Stefansson's recognition came largely through the effort of publications and lectures. His writings were creative and sometimes purposefully controversial. During his years in the north, he accomplished spectacular feats while adapting to life there as the natives had done. As an ethnographer, his observation in Victoria Island and Coronation Gulf involved a culture still in the stone age, although the people employed native copper for tools and projectiles.

Part II of the Symposium was intended to be the more substantial portion. It contains a series of chapters on various scientific aspects somewhat related to Stefansson's interests. Most are summaries of research published elsewhere. The first title, "Human Nutrition," by Johnson *et al.*, was a matter of prime concern to the arctic author. Although the essential nature of fresh food had been known for a couple of hundred years, Stefansson's espousal of a pure meat diet was regarded as imaginative. Fresh meat from large mammals, especially seals, was demonstrated to be adequate for strenuous activity in a cold climate. His advocacy of pemmican as a staple may have been misunderstood. Peary had apparently used it as a major portion of his rations and the *Karluk* carried hundreds of pounds as basic fare. Clinical survival tests by the armed services have shown that this kind of processed meat can serve only as a supplement.

"The Discovery of the Essential Fatty Acids," by G. Edgar Folk, acknowledged field tests made by Stefansson in 1909-10. In his writings based upon those observations, it was noted that the Eskimo knew small mammals and lean caribou would not sustain life. Additionally, the organs, marrow, and fatter portions of a carcass were normally consumed in preference to the lean meat in rump and loin. Similarly, polar bears ate only the back and parts of the hide from a seal. A fat-deficiency syndrome was examined in laboratory animals at

about the same time that Stefansson and Anderson volunteered to live on only meat for a year as an experiment.

In "An Eskimo Diet Experiment," Hugh Sinclair described his personal experience, after observing that these carnivorous people had neither high cholesterol levels nor arteriosclerosis. He was able to live in a small, isolated settlement on the northwest Greenland coast and utilize native food high in unsaturated fatty acids. His body weight lowered by about 10 percent, and some plasma fatty acids decreased by as much as 80 percent as blood-clotting time increased about 10 times.

"Exercise in the Cold," by Carl V. Gisolfi, recorded effects of physical training upon subjects exposed to a temperature of 10°C. Experiments indicated that physical activity increased metabolic rate during cold acclimatization. Body temperatures were elevated with greater tissue vacuolation and blood flow.

"Lipid Metabolism in Arctic Mammals," by J. Homer Ferguson, substantiated the thought that an organism can generate heat from stored body fat. Arctic animals normally maintain high levels of free fatty acids in their blood. Experimentally, a diet high in unsaturated fats produced superior cold resistance. Endocrine factors, such as thyroxin, enable rapid mobilization; a quick response in cold-adapted species is important for survival. The abrupt drop in autumn temperature can be anticipated by photoperiod. Some questions remain, such as how can fats be stored selectively in body extremities and how can certain fatty acids be mobilized, leaving others?

"Arctic Birds in Winter," by James A. Gessaman, included a survey of only four year-round inhabitants with quite different habits. The owl is relatively large and excellently insulated; it can hunt efficiently in darkness by coursing. The raven is primarily a scavenger with diverse food tastes and a relatively high metabolic rate. Gyrfalcons are of a size comparable to the others but more energy efficient, for they can normally observe prey and secure them by short flights from a perch. Rock and willow ptarmigan are herbivores only half or a third the body size of the others, so need to have a high metabolic rate.

"The Arctic Scientist," by Warren O. Essler, explored what further possibilities exist in experimentation by electronics. A revolution in fact-finding and communication has already added data more rapidly than they can be assimilated. Implanted transmitters can now provide just about any needed information from a remote locality and deliver it to a conveniently situated laboratory. There is no practical limit in either category.

Walter W. Nassichuk summarized the present knowledge concerning exploitable mineral deposits in "Arctic Islands." Petroleum is the most important resource. Oil exploration on the Arctic Slope and offshore has progressed so rapidly during the five years since his original manuscript was prepared that all figures on reserve estimates are now significantly greater. Stefansson's early speculations did not emphasize petroleum. He forecast other possibilities of development in high latitudes — most of which turned out to be too optimistic. Land areas in the Arctic are still a desert with relatively low productive capacity; large-scale domestication of animals for meat and wool has not proven feasible. He visualized fossil fuels as replacement for drift wood and seal oil. Coal deposits in the eastern Canadian Arctic have been used by explorers but are too thin and remote to be regarded as commercial; the situation in Spitzbergen is much better. Metallic ores fall in the same general category, although consequential lead-zinc deposits have been mapped in the Cornwallis District. A token shipment for assay purposes was made in 1973.

Surface indications of petroleum were known at Ft. Norman on the Mackenzie River historically. Because of its strategic position, some small productive capacity was established during World War II but none was trans-shipped. At the same time, gas fields were drilled in the Naval Reserve near Pt. Barrow. Stefansson lived long enough to see exploratory drilling initiated in the eastern archipelago, a test that found only a little gas in southern Melville Island. Later in 1962, a significantly large oil accumulation was discovered in northwestern Melville. Finding a giant oil and gas field near Prudhoe Bay in 1969 suddenly changed the developmental picture, because it justified construction of a 1000-mile pipeline to the ice-free south coast of Alaska.

The Arctic is still in an early exploratory phase, with relatively few test bores for such a vast territory. It is considered to be a proven oil province, and most of the logistical problems have been solved. On this basis, probability figures for discoverable reserves are a standard tactic sufficiently realistic for planning purposes. Nassichuk's revised statement gives a current viewpoint:

In the regions that Stefansson travelled, the search for oil and gas has continued relentlessly. In the Arctic Islands alone, some 180 wells have been drilled and nineteen are classed as discoveries; ten are gas fields, four oil, and five oil-and-gas. Under anticipated economic conditions several of these are believed to be commercial, although the calculated recoverable reserve is less than a half-billion barrels of oil and 20 trillion cubic feet of gas in total. Undiscovered resources are expected to approximate five billion barrels and more than 100 trillion cubic feet. Greater potentialities are likely to lie in the Sverdrup Basin, to the north, where costs are higher. Within the last few years more than 160 wells have been drilled in the Beaufort Sea-Mackenzie Delta area with a discovery of about one billion barrels of oil and 10 trillion cubic feet of gas. This area is expected to contain nearly ten billion barrels and 100 trillion cubic feet yet undiscovered, on the basis of calculated estimates from comparable provinces and conditions known to exist here. That portion to the west of the international boundary with Alaska is virtually untested. The situation has been found to be relatively complex, structurally and stratigraphically. An average of resource estimates released by the National Petroleum Council of the United States gives about six billion onshore and 12 billion offshore for Alaskan Arctic recoverable oil. Comparable gas potential is 22 trillion onshore and 27 trillion offshore.

In the final article of the symposium, "Relation between Barometric Pressure and Geophysics," Terris Moore explores some mysteries of high-latitude surveying. Sea level has been found to be notoriously vague as a precise reference, and because of its oblate form the earth's only positive measure is from the center. It is important to know that altimeter measures in aircraft consistently read lower for mountain crests than the same observation on the ground. Other variables can be calibrated. Contraction of the earth's atmospheric envelope at the poles is accentuated during the winter season and represents another possible complication, when simple devices are used for record. In a practical sense, the 27 miles difference in polar diameter has little meaning; however, mountain peaks of Alaska and the Yukon extend well above the atmospheric median and are thus 10 percent physiologically higher than comparable elevations near the equator.

William M. Furnish
Professor Emeritus
Department of Geology
Trowbridge Hall
The University of Iowa
Iowa City, Iowa 52242
U.S.A.

AASIVISSUIT—THE GREAT SUMMER CAMP: ARCHAEOLOGICAL, ETHNOGRAPHICAL AND ZOO-ARCHAEOLOGICAL STUDIES OF A CARIBOU-HUNTING SITE IN WEST GREENLAND. By BJARNE GRØNNOW, MORTEN MELDGAARD and JØRN BERGLUND NIELSEN. Kommissionen for videnskabelige Undersøgelser i Grønland (The Commission for Scientific Research in Greenland). Meddelelser om Grønland, Man & Society 5, 1983. 96 p. Tables, figs., appendix. Softbound. Dkr. 177.20.

Possibly more so than any other single game species, caribou have predominated in the affairs of northern hunters. Evidence recovered from the Upper Paleolithic caves of ice-age Europe and from Paleoindian camp sites in the New World demonstrate the antiquity of adaptations based on the predation of caribou. Archaeological and ethnographic research in the circumpolar north, from Scandinavia to Siberia and from Alaska to Greenland, readily attest to the central role of caribou in many northern economies. The antiquity and the geo-

graphical diversity of caribou-hunting cultures is evident in the variety of hunting techniques and strategies documented.

This volume, an analysis of ethnohistorical and archaeological data pertaining to a caribou-hunting site, Aasivissuit, "The Great Summer Camp," in the interior of West Greenland, represents a major contribution to the literature on the cultural-ecological relationships between caribou hunters and their prey.

In a brief introduction the research at Aasivissuit is framed within a cultural resource preservation paradigm. The research goal was not to excavate the entire site; rather, a meticulous sampling design and small-scale excavations were conducted to determine the occupational history of the site and reveal the changing dynamics of the seasonal exploitation of caribou. Following the introduction there is an encapsulation of the geography, climate, and available resources of interior West Greenland, which serve to define the physical restraints operating on caribou and caribou hunters. The authors conclude their review of caribou biology with a discussion of the dramatic fluctuations that characterize caribou population size. Information is derived from historical sources that reveal periodic radical oscillations in caribou numbers. Climatic change, human predation, and overgrazing of foraging areas are all considered as factors that might contribute to the cyclical decline in caribou population size, but no clear causal relationships are derived. Resolution of this problem would go a long way toward facilitating models of interior hunting adaptations throughout the circumpolar north.

Anthropological research in Greenland, as well as in many parts of the Arctic, has a coastal bias, a reflection of the maritime focus of most native economies. Logistical constraints, and the defending insect hordes of the interior, have kept most researchers bound to navigable waterways and windy shore-side encampments. The authors of this work break from this tradition in presenting a surprisingly vivid view of the inland summertime caribou hunt of the West Greenland Inuit. As a specific case study it provides substantial data for reconstructing settlement-subsistence patterns in prehistoric and historic Inuit society in Greenland. As a model of interdisciplinary research, a tightly composed presentation that builds on data derived from ethnohistorical and ethnographic sources, archaeology, and archaeozoological and environmental analyses, it should serve to encourage similar research elsewhere in the Arctic wherever caribou are a significant prey species.

The study focuses on research at Aasivissuit, a major summer caribou-hunting camp situated approximately halfway between the coast and the inland ice. As prelude to the archaeology, the authors provide a detailed presentation of the interior caribou hunt as derived from historic and ethnographic sources. Inuit drawings (including several by Aron of Kangek, c. 1858) and numerous photographs (1898-1958) are a valuable complement to the text. The authors' review of the ethnohistorical material adopts a broad anthropological perspective: among the topics covered are a discussion of the composition of hunting bands, the roles of women (the interior hunt was a family affair), the factors influencing resource-scheduling decisions, and the social aspects of the caribou hunt (including leadership roles, the acquisition of prestige, and the maintenance of social relationships among members of an otherwise dispersed population). The authors also discuss the nature of the journey from the coast to the interior camp at Aasivissuit and the variety of dwelling types constructed during the caribou hunt. Hunting strategies are presented as dynamic and processual, with considerable variability as a result of both changing ecological factors (principally the size of the caribou population) and the advent of different hunting technologies (use of kayaks, bow and arrows, guns). For the Greenland Inuit, caribou represent an important food source (arctic epicureans will appreciate the references to *angornardluk*, *qajooq assigaaq*, and *nerukkaq*, the later a fermented liver salad made with the contents of caribou stomachs). Equally important were skins for clothing and sleeping robes and antlers for weapon parts.

The archaeological work at Aasivissuit neatly complements the preceding ethnohistorical accounts. The remains of a wide variety of structures, including house features, tent rings, storage cairns, hunting features, stone fox traps, graves and stone alignments (the hopping-