

(0.5-1.5 m deep), some round or oval, was found on the scree which "reaches Whalebone Alley from the peak Amaralyk" (p. 38). Here mummified remains of walrus meat and possibly also of whale have been found. Such storage pits, though not used by historic Asiatic Eskimos, are known to them and have a special name, *pygvigil* (p. 38).

Below the talus, close to the lines of skulls and mandibles, between the mandible posts marked P and Q, four ring-shaped structures 1.5-2 m in diameter were found, bordered by large boulders. To the southwest of the last of these there is a rectangular 3 × 3 m structure of large stone blocks. The remaining height of the walls ranges from 0.8 to 1.6 m. The entrance to the structure is oriented toward the sea and is flanked at a distance of 1.5 m by two very large boulders oriented the same way as the whale skulls. The authors consider this to be a remnant of a stone house, a surface structure uncharacteristic of the historic Asiatic Eskimo but reminiscent of ancient dwellings found in the Bering Strait area (p. 36, Fig. 35). However, since there are signs of relatively recent use, the authors do not exclude the possibility that this house structure is not related to Whalebone Alley.

Space restrictions prevent a discussion of the ethnographic data offered by the authors to demonstrate that Whalebone Alley represents an ancient Eskimoan culture. The presentation is excellent, and most of the conclusions are well founded. The interpretation of the monument as a ritual structure, in my opinion, is beyond doubt. I cannot quarrel either with the postulate that the builders of Whalebone Alley possessed a complex social order, or that there are links between Old Bering Sea and Southwest Alaska cultures. I find difficulty, however, in accepting the interpretation that Whalebone Alley was used by a secret whalers' society. The authors base this last interpretation on Lantis's (1938, 1966) reconstruction of whale ceremonialism in Alaska and on the Northwest Coast. Excellent as it is, there are points open to challenge, and it is precisely these points on which the authors rely in their interpretation. Specifically, the strongest evidence links the Bering Strait area to the Aleutians, but Lantis's hypothesis of the existence of whaling societies among the Aleuts is the weakest point in her presentation. My own research indicates that whaling in the Aleutians was recent and had very restricted distribution — much more limited than postulated even by Heizer (1938, 1943a, b). The existence of secret whaling societies among the Aleuts I consider very unlikely, though they may have existed among the Koniag. The emergence of the Koniag as a political entity, the appearance of the Koniag culture in southwest Alaska, and the patterns of interaction between the Aleuts, the Koniag and Indians of the Northwest Coast are far from clear, and the temporal framework for such patterns has not been developed. In short, before one ascribes Whalebone Alley to an elite of whalehunters who constituted a secret ritual society, further investigation is needed of the spread of whaling and of rituals and social-grouping formation associated exclusively with whaling, not only in Alaska but elsewhere. No doubt, in any such future investigation Whalebone Alley will play a major role.

The book is a must for archaeologists and ethnographers concerned with Eskimoan and Alaskan cultural history and development. Translation of the book into English at the earliest possible date is urged.

## REFERENCES

- BLACK, L.T. In press. Aleut Art. Anchorage: Aleutian/Pribilof Islands Association Inc.
- HEIZER, R.F. 1938. Aconite arrow poison in the Old and New World. *Journal of the Washington Academy of Sciences* 28(2):358-364.
- . 1943a. Aconite Poison Whaling in Asia and America: An Aleutian Transfer to the New World. Smithsonian Institution Bureau of American Ethnology Bulletin 133. Washington, D.C.: U.S. Government Printing Office.
- . 1943b. A Pacific Eskimo invention in whale hunting in historic times. *American Anthropologist* 45(1):120-122.
- LANTIS, M. 1938. The Alaskan whale cult and its affinities. *American Anthropologist* 40(3):438-464.
- . 1966. Alaskan Eskimo Ceremonialism. (Originally published 1947.) Monographs of the American Ethnological Society No. 11.

Lydia T. Black  
Associate Professor of Anthropology  
Providence College  
Providence, Rhode Island 02918  
U.S.A.

A CENTURY OF CANADA'S ARCTIC ISLANDS. Edited by MORRIS ZASLOW. Ottawa: The Royal Society of Canada, 1981. Proceedings of the 23rd Symposium. 358 p. CAN \$20.00 soft cover; \$25.00 hardcover.

The centenary in 1980 of the transfer of the Arctic Islands from British to Canadian sovereignty provided the occasion to take stock of developments in the most northern, and for long the most neglected, part of Canada. The bold decision by the Royal Society of Canada to hold a symposium in Yellowknife, Northwest Territories, was amply justified by an attendance of about 180 participants and good media coverage, made possible by excellent local support through the courtesy of Commissioner John Parker and the Government of the Northwest Territories.

For many years, because of the vast size and sparse population of the country, there was a general attitude among Canadians that since the frontier and bush are close anyway, why bother about the far north? Changes in this attitude emerged only if sovereignty seemed to be threatened, or when exploitable minerals were found. Minerals were not found in commercial quantity in the Arctic Islands until oil and gas exploration started in the 1960s, but at the beginning of this century fears of possible American or Norwegian claims to sovereignty, based on right of discovery, led to the establishment of the Eastern Arctic Patrol. Apart from this and apart from the establishment of Royal Canadian Mounted Police stations on Devon Island and Ellesmere Island, there was — with one notable exception — no Canadian Government activity in the Arctic Islands until World War II, when the advent of aircraft and American involvement in the Arctic forced a change in policy. The exception was the Canadian Arctic Expedition of 1913-18, led by Vilhjalmur Stefansson who, largely on his own initiative, made important discoveries in the northwestern Arctic Islands. There were of course a number of foreign expeditions that penetrated the area in the period 1880-1945, and whaling continued in the Beaufort Sea and Davis Strait up to 1915. But after World War II the establishment of the Canadian-United States Joint Arctic Weather Stations provided jumping-off points for geological (and other) investigations, which in turn led to the recognition of the oil and gas potential of the Arctic Islands and a quickening of government interest in the area. Government policy was also influenced by strategic considerations.

Such, in brief, is the background ably described in three papers on geographical exploration (William C. Wonders, Hugh N. Wallace and Alan Cooke), and in papers on whaling (W. Gillies Ross), administration (the Editor himself), jurisdiction (Donat M. Pharand), shipping (T.C. Pullen), aviation (co-authors K.R. Greenaway and Moira Dunbar) and defence (Richard J. Diubaldo). The remaining sixteen papers deal with scientific research (Svnen Orvig on meteorology; M.J. Dunbar on oceanography; E.R. Pounder on ice and snow; S.D. MacDonald on terrestrial biology; co-authors R.L. Christie and J.Wm. Kerr on geology; Peter Schledermann on archaeology), mineral exploitation (co-authors D.C. Findlay, R.I. Thorpe and D.F. Sangster on non-hydrocarbon minerals; Gordon H. Jones on oil and gas), environmental concerns (Robert Page), new styles in administration (F.A.E. Cserepy), Canada and the circumpolar world (Trevor Lloyd), and broadly the people of the north and their culture (Milton M.R. Freeman, Minnie Aodla Freeman, Peter Ittinuar, Graham W. Rowley, Thomas H.B. Symons). The Editor remarks in the Preface that "contributions . . . varied in many ways, and the result was unevenness of styles and treatment, gaps and repetitions." And he might have added unevenness of quality. Fortunately his skill has largely overcome these problems, if a blind eye is turned on one or two offerings.

The scientific research papers provide useful summaries of past field work and of knowledge acquired, but some fall short in identifying the main problems to be resolved and in charting the course of future work. On the other hand, the papers on technology and mineral exploitation are more forward-looking, and reflect a confidence that the conflict between economic and environmental interests, and the interests of the native people, can be overcome — a confidence that may or may not be justified in the crucial decade of the 1980s. In both lots of papers some authors list numerous primary reference sources, but other authors, presumably uncertain of their readership, rely mainly on secondary sources or have omitted references altogether. It is of course only too easy to pick on omissions and deficiencies in review papers, but two more may be worthy of notice. In geological research there is no reference to the seminal paper by Y.O. Fortier and L.W. Morley (1956) on "Geological Unity of the Arctic Islands" (*Transactions of the Royal Society of Canada* L(II):312) and in ice research, where surging glaciers are worth a paragraph (p. 166), there is no mention of the glacier at the head of Otto Fiord, Ellesmere Island, the only glacier in the Canadian Arctic known to have surged (*Nature* 20(4915), 1964:176).

In a brief incursion into politics, S.D. MacDonald observes (p. 180) that "investment in scientific research and the establishment of small field stations in the Arctic Islands is surely the least costly means of demonstrating Canadian sovereignty there," a point also made by me some years ago, as he kindly acknowledges. His recommendation is exemplified by the operations of the Polar Continental Shelf Project. Except in specialized cases, demonstration of Canadian sovereignty is not a job for the Canadian Forces, for as a warlike French Canadian Major at CF Headquarters, Yellowknife, succinctly put in to me in 1971, "Our main problem is lack of enemy!"

The papers mainly dealing with northern people make it clear, if it was not already clear to the reader, that there is no easy path ahead for the Inuit. Their uncertainty about the future is poignantly expressed by Mrs. Minnie Freeman of native birth, who in her words "permanently adopted" a scientist from the south — her husband. Her voice must be heeded when she says (p. 274) that "no one should any more be taking so lightly Inuit land claims, for that is where the fairness and equality begins for the native people." She has the evidence of archaeology on her side. Unfortunately it is at present impossible to predict or prescribe the path ahead for the Inuit; it is possible only to outline the problems, as Graham Rowley (spelt "Rowky" on p. 307) from his great experience has done. He sees the main problems as stemming from segregation between white and Inuit populations (with an estimated 58%, mainly white, of the total population dependent on government employment), competition between departments of the federal government with resulting inefficiency, lack of conservation, and poor social environment.

The final paper in the volume is remarkable only as a piece of "cultural" padding and for the phrase, "In due course, and not too long a due course at that . . . !" A pity, as the opportunity was lost to draw together the main themes of this valuable Symposium whose proceedings may long serve as a benchmark for future endeavour.

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

THE LAKE ATHABASCA SAND DUNES OF NORTHERN SASKATCHEWAN AND ALBERTA, CANADA. 1. THE LAND AND VEGETATION. By HUGH M. RAUP and GEORGE W. ARGUS. Publications in Botany No. 12. Ottawa: National Museums of Canada, National Museum of Natural Science, 1982. 96 p. No price indicated.

Geomorphology has long provided a framework on which to build vegetation succession studies. H.C. Cowles set this approach in motion in 1899 with his classic study of the vegetation succession on the Indiana Dunes. The essence of his approach was the idea of a chronosequence, a spatial set of dunes which was ordered into a temporal landform-development sequence using the physiographic ideas of W.M. Davis. The dunes' chronosequence ran from the young, actively-moving dunes near Lake Michigan to the older, stabilized dunes further from the lake. Cowles then assumed that the vegetation growing on these dunes had developed in conjunction with the dunes themselves. The vegetation on the dune chronosequence thus represented a plant succession.

It is of some interest that in the monograph reviewed here, the authors study another large dune complex but use G.K. Gilbert as their guide to the geomorphological framework. This scheme emphasizes the diverse interplay of geomorphic forces and the resulting stochastic change in the landforms. Raup and Argus describe vegetation as being selected by the sand-movement characteristics: frequency, amount, and rate of burial and exposure. The actual species-selection on the dunes is dependent on specific life-history traits which best fit the present and recent interplay of these physical forces.

In this monograph, Raup and Argus bring together most of what is known of the origin and development of the Lake Athabasca sand dunes since post-glacial times and of the relationship of the vegetation to the dune complex. It includes not only the few published studies for the area, but also hitherto unpublished work done by Raup in the 1930s and by Argus, R. Hermesh and D. Smith in recent decades. This monograph is the first of two, of which the second (not yet published) will be a consideration of the flora and the botanical endemism in the dunes.

The first third of the present monograph is devoted to the post-glacial chronology of the regions of Lake Athabasca, Peace River and northeast

of Great Slave Lake. The authors postulate that the sand for the Athabasca dunes came from exposed Precambrian sandstones which formed the beds of extensive post-glacial lakes. The evidence for the distribution and heights of these lakes (Tyrrell and McConnell) is reviewed. It is suggested that the actual formation of dunes south of Lake Athabasca started 8500 years ago, and that it resulted from: the retreat of Lake McConnell and subsequent exposure of loose sand on its bottom; the strong winds from across the surviving lake; and a depauperate vegetation which could not stabilize the sand.

The vegetation at that time is believed to have been mostly a gallery forest of *Picea glauca* var. *albertiana*, with interfluvial areas occupied by tundra. The forests did not appear on the interfluvia until after the xerothermic (hypsothermal), about 5000 BP. Intense aeolian activity appears to have occurred to the end of the xerothermic. The continuation of aeolian activity to the present time is ascribed to an environment that has not changed enough to allow more contemporary vegetation to stabilize these dunes.

This section of the monograph should be very useful for its summary and interpretation of post-glacial events. Its many figures, tables and maps are particularly welcome. However, the lack of extensive empirical evidence for the regions makes some of it speculative.

The next short section is the obligatory description, and attempt at a useful classification, of dune and related forms. The authors consider the dunes to be mostly parabolic, though transverse and oblique ridge dunes, precipitation ridges and others are reported. Aeolian residual features such as gravel pavement and dune slacks are described. The reader is assumed to have a working knowledge of dune-forming processes.

The final section is concerned with vegetation patterns on the dunes. The common vascular species which are capable of surviving the continuous physical disturbance caused by moving sand are few, numbering about ten. These species recur in almost every combination possible, so that community-type connotations are of little utility. Raup prefers the term "assemblage" as implying this more independent organization. In place of using the "succession-chronosequence" framework for discussion of vegetation-dune dynamics, Raup and Argus suggest that the vegetation is the result of a combination of environmental factors. They start by briefly discussing the factors affecting germination and establishment, with respect to gradients of moisture, sand movement, and nutrients (including organic matter). Next they describe the species which seem to survive best on dunes in other regions with comparable dune processes. This approach, used by J.T. Hack (1941) in his pioneering study of dune processes (*Geographical Review* 31:240-263), consists of dividing dunes on the basis of different rates of erosion and deposition. Raup and Argus show (though not too explicitly) that similar rates of erosion and deposition produce similar species combinations. As a plant ecologist, I found this discussion exciting, but at times frustrating because of their use of a descriptive approach in situations which cry out for quantitative measurements of aeolian and vegetation processes. Short of this, a useful table could have summarized the qualitative frequency and magnitude categories of aeolian erosion and deposition processes, and the associated species (and their life-history traits) which perform best under these conditions. Such a table would also have clarified why Cowles's successional sequences can be replaced by equally predictive systems which do not require development assumptions.

In closing, I would be remiss if I did not comment briefly on the contributions of the senior author. H.M. Raup, Emeritus Professor at the Harvard Forest, has over the last 50 years documented — in almost every conceivable habitat, from tundra to tropics — the central role of physical disturbances in determining vegetation assemblages. Raup sees vegetation as a spectrum of species having variable life histories, each adapted to the particular frequency and magnitude of the physical disturbances operating within a habitat. Readers who are not familiar with Raup's ideas may find the recent collection of his writings, *Forests in the Here and Now* (edited by B.B. Stout and published by The Montana Forest and Conservation Experiment Station, University of Montana), to be useful. The title itself indicates Raup's dissent from the developmental concepts of vegetation dynamics.

E.A. Johnson  
Department of Biology  
The University of Calgary  
Calgary, Alberta, Canada  
T2N 1N4