

a professor of geology at the University of Arizona but no mention is made of his years as one of Carlton College's most outstanding presidents. There may be others, not known personally to this reviewer, who also have been misidentified.

Mr. Lewis' idea of relating the scientific work in the Antarctic to the men who planned and carried out the research is a good one. Supposedly, this was done to 'humanize' the story as told by the author. The humanization does not come through very well, at least not to this reviewer. Names mean very little to a reader unless he can attach them to individual characteristics and personalities. The people named by Lewis in his book do not seem real, an unfortunate circumstance which only adds to an already mistaken concept held by laymen about scientists, namely, that they are cold, humourless stereotypes who subjugate their own personalities to their scientific work.

Because Mr. Lewis does not say what he was trying to accomplish by writing *A Continent for Science*, it is difficult for one to say whether he has succeeded or not. If the book is really 'a labor of love', as the dust jacket claims it to be, then Mr. Lewis will have to be his own judge. If it is offered to the public as an informative book for the non-scientist who wants to get an idea of what the Americans have been doing in the Antarctic, *A Continent for Science* is reasonably successful. Mr. Lewis had to do a considerable amount of research to be able to write this book because it does cover an enormous range of subjects that must have been quite foreign to a person of his professional background. Were it not for the unreliability of the author in reporting scientific facts and other information, this reviewer would have been more enthusiastic about *A Continent for Science*.

JAMES H. ZUMBERGE

LETTERS FROM HUDSON BAY 1703-40. K. C. DAVIES, editor, London; *The Hudson's Bay Record Society*, Vol. XXV, 1965. lxxiii + 455 pages.

This latest volume assembled from the Company's archives gives us in full the reports home from the posts of Albany, York, Churchill, and Moose in the early eighteenth century — scattered at first; regularly and annually at the end.

At the beginning only Albany was in the Company's hands; all other posts had fallen to the French. After the treaty of Utrecht, York Factory was handed back (quite cheer-

fully by the French Governor, as he had experienced nothing but difficulties and the buildings were in ruin). From this date on it was a period of expansion for the Company, but although French military activity was over, the competition of their trading posts inland and of their 'wood-runners' was considerable.

The letters give us an intimate picture of the stern monastic life at these tiny outposts. There were 27 men holding the remnant of the Company's empire in 1703, a number that was to grow to 530 by the end of the century, nearly 80 per cent of whom were then Orcadians (J. W. Anderson, *Fur Traders Story*, Toronto 1961).

A stern eye was kept by London on every matter pertaining to finance and discipline with an annual volley of detailed instructions, to which the harassed post managers replied as best they could. From Kelsey's biography we learn that his wages ceased the day he was captured by the French in 1694. And much writing is devoted to success or failure of the goose hunt on which the Company's men relied greatly for winter fare.

Despite what an authority such as Margaret Lantis has said recently in *The Arctic Frontier* (ed. R. St. J. Macdonald, Toronto 1966), there was considerable inter-Indian warfare, particularly conflicts between the Crees and Athapaskans. In 1724 the 'Southern Upland' Indians had massacred the 'Northern' Indians' families, while the latter were endeavouring, as urged by the Company, to increase their catch of small furs. (Beavers were beginning to glut the market, as the French were finding to their cost.) And there was always Indian hostility to the Eskimo. After one raid on the East Main a surviving captured Eskimo boy was purchased from the Indians by the Company for 1 pound tobacco, 1 gallon brandy, and 1½ yards of blue cloth!

The local managers were always endeavouring to curtail such strife for the sake of trade, sending men with interpreters to pacify the tribes, but further civilising attempts were frowned on — "The Company are very much displeased to hear that any Indian is taught to Write and Read . . . nor suffer any such practice in the future" (p. 102).

No, their job was to survive as best they could and trade. Many interesting details appear about this trade. We meet the comically anglicised terms for strange North American furbearers, quickhatches (wolverines) and veejacks (fishers). "White fox is of little value to us." (How different in the 1920's to 1940's) "Ye Rabbit and musk Ratt not worth sending home."

After guns, powder, and shot, brandy was what the Indians wished most, plus some blue cloth, kettles, and fine feathers and beads. Unfortunately only one trade goods indent is included in the book but this is enlightening, as well as the fact (p. 164) that a silk handkerchief was worth 1½ beavers.

Several biographies conclude the book, including those of Knight who grew old in the service, and finally perished on a northern voyage in search of minerals; Kelsey his rival, but not Norton who, like many others, was a good linguist, but had little knowledge of building when he was charged with construction of the biggest British Fort in North America (Fort Prince of Wales, Churchill).

And one very definite success story: John Fullartine who started with the Company in 1683 at £6 per annum, was at Albany when the French captured it 3 years later, but repulsed them in 1709 when he was manager. Two years later he was on the Committee and a shareholder, and died in 1738 holding £2000 of stock paying a solid 10 per cent per annum.

The volume is well designed, arranged, and indexed, but one can criticise it seriously on the lack of any map whatsoever. Your reviewer is fairly familiar with the geography of southern Hudson Bay, but the average reader must be totally lost when reading descriptions of the moves of York Factory, or where ships were wrecked or had to winter. Why cannot historians learn a little geography?

P. D. BAIRD

TRAITÉ DE GLACIOLOGIE, TOME II: GLACIERS—VARIATIONS DU CLIMAT — SOLS GELÉS. By LOUIS LLIBOUTRY. Paris: Masson & Cie. 1965. 10 x 7½ inches, 612 pages (429-1040), 224 figures, numerous pictures, 40 plates. 190 f.

The second volume of this monumental text on glaciology has followed the first one (reviewed in *Arctic* 18:202-3) within a very short time. It deals with glaciers, their distribution and behaviour, and with frozen ground, and treats a very wide range of questions connected, occasionally even rather loosely, with the occurrence of ice on earth. The volume shows again the very wide knowledge of the author and is very up-to-date covering the literature to the middle of 1965. The author's claim that this will be the last Handbook of Glaciology written by one author, is probably true. It is unfortunate that in this volume too a great number of publications are mentioned, discussed, or contradicted which are not found

in the extensive references which accompany each chapter. This makes it difficult for the student of the book to weigh the author's opinions independently.

The volume starts in Chapter XII with a description of the principal qualities of glaciers, of their zones of accumulation and ablation, of their mass economy and their motions. Chapter XIII deals with the extent of the present glacierisation, aided by impressive photographs and by some maps.

The geophysical methods used in the study of glaciers, surveying, drilling, and particularly the determination of ice thickness and stratification are described in Chapter XIV which stresses the seismic and the quite recent radar methods. Chapter XV treats in considerable detail the behaviour of glacier ice as a viscous-plastic body starting with Bye's theory and proceeding to more general cases. In this connection the different types of crevasses and deformations of the ice are discussed.

Chapter XVI deals with the ice motion at the surface and at depth. Particular attention is given to the problem of gliding at the bottom; this part contains much original work by the author. In this case actual observations are almost completely missing, and different models of bottom motion, by pressure melting and refreezing, by plastic yield, and by over-riding of depressions are considered. The stationary glacier flow can be disturbed by the formation of waves which move with a speed that exceeds the mean motion of the ice. Their theory is developed. Glaciers might get into an unstable state and might then expand for several kilometres in a few months. Such conditions can also lead to falls of great masses of ice and to the formation and sometimes the catastrophic outbreaks of water bodies stored at the side of or inside a glacier.

The motion of glaciers causes accumulation and erosion of rock material. The author stresses in Chapter XVII the physical processes that come into play. But the conditions of removal and deposition are too complicated for numerical treatment, and he has to restrict himself to a description of the processes and phenomena.

In Chapter XVIII, first the changes of glacier extent in historical times are given. This is followed by a detailed mathematical treatment of the variations that a glacier undergoes under the influence of changes in its mass economy, according to the older theories of De Marchi and Sebastian Finsterwalder and the modern ones of Nye, Weertman, and of the author himself. Chapter XIX deals with