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level of controversy when things are discovered which not all readers agree with.

Provided they can afford the book. I made the same argument when reviewing Lliboutry's *Very Slow Flows of Solids* (\$145), and will repeat it here. This book costs \$109, and one is led to some conclusions about the market strategy of publishing companies. Either publishers are content to sell such books to libraries only, or they believe that the glaciological community might regard them as so indispensable that price will not be a deterrent. With regard to the idea of committing such books to libraries, I object that textbooks, especially high-level ones, can be absorbed better by readers if they are a part of the reader, free to be toted around, marked up (typos corrected, I might add), and generally treated as the readers treat themselves. This plainly should not happen to a library book. Zotikov, and Lliboutry, deserve a wider audience. As for the notion of indispensability, the publishers should not believe that these specialized books, as good as they are, are indispensable. They are not to be grouped with such books as, for example, Morse and Feschbach's *Methods of Theoretical Physics*, whose encyclopedic status makes it, for physicists, a necessary item regardless of cost. I can also point out that indispensability does not automatically justify high cost. Perhaps the only truly indispensable textbook in glaciology—Paterson's *Physics of Glaciers*—currently costs \$19.95. Even the finest caviar will not be indispensable when good oats are plentiful and cheap.

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ABRUPT CLIMATE CHANGE: EVIDENCE AND IMPLICATIONS. Edited by W. H. Berger and L. D. Labeyrie. (NATO ASI Series C: Mathematical and Physical Sciences Vol. 216.) Dordrecht: Reidel, 1987. xix + 425 pp. \$66.00. ISBN 90-277-2604-3.

This book is the third in a series deriving from an interdisciplinary NATO conference on climatic change. It is divided into seven parts: an introduction dealing with definitions of abrupt climatic change, followed by sections on the last millennium, the Holocene, the Glacial-Holocene transition from land records, from ice records, and from the deep-sea record, and finally climate modeling. Thus, the arrangement is largely according to time scales, rather than to cross-cutting problems. In all, there are thirty contributions of varying levels of detail. The first chapter by the editors serves as an overview of the highlights of the papers that follow. Lacking, however, is a concluding statement of outstanding issues that remain to be solved, directions that should be followed, and implications of the findings.

The theme of the conference repeats that of an American Quaternary Association (AMQUA) (1982) meeting at Seattle on the "Character and Timing of Rapid Environmental and Climatic Changes." Although there is scarcely any overlap in the participants, similar issues of definition, mechanisms, and proxy responses to climatic change are raised. The coverage of topics is fairly complete, although the retreat of Alpine glaciers since the Little Ice Age, illustrated in the frontispiece, is not discussed. Missing, also, is any discussion of catastrophe theory, climate system intransitivity, or Hopf bifurcations. The question of phase relationships between different parts of the climate system and the response of proxy indicators is discussed in some individual

sections—yet does not appear in the index! This important topic clearly merits some overview treatment.

The quality of the production is much improved over earlier volumes in the series in both the consistency and legibility of the printing and the clarity of the illustrations. Reference citations are given in full, essential for inter-library loan purposes, but the index is too meager.

In summary, this book provides a valuable survey of recent climate change research spanning a range of time scales. It can be recommended to specialists in Quaternary studies and paleoclimatology; it should also provide useful perspective to modelers concerned with future climatic trends.

REFERENCE CITED

American Quaternary Association, 1982: *Seventh Biennial Conference. Program and Abstracts*. Seattle: Quaternary Research Center, University of Washington. 188 pp.

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RESEARCH IN ARCTIC LIFE AND EARTH SCIENCES: PRESENT KNOWLEDGE AND FUTURE PERSPECTIVES. Proceedings of a Symposium held 4–6 September 1985, at Abisko, Sweden. Edited by Mats Sonesson. (*Ecological Bulletins* 38.) Copenhagen: Munksgaard International Booksellers and Publishers, 1987. 112 pp. Price DKK 160. ISBN 87-16-10034-3. (P.O. Box 2148, DK-1016 Copenhagen K, Denmark.)

Ecological Bulletins is a series of monographs, reports, and symposia proceedings on topics of international interest published by the Swedish Natural Science Research Council and the Swedish Council for Planning and Coordination of Research in cooperation with the ecological journal *Holarctic Ecology* and *Oikos*. This volume is a series of papers from a symposium held at the Abisko Scientific Research Station to celebrate the station's 50th anniversary of its affiliation with the Royal Swedish Academy of Sciences.

The volume contains eight papers by respected arctic scientists. Seven invited papers cover subjects on which research is being done at the station, and an additional paper was added that describes the history of man's impact in the Abisko region. The abiotic environment of the Arctic is discussed in a series of three papers: "Periglacial geomorphology in North America: Current research and future trends" by Hugh M. French, "Northernmost Scandinavia in the geological perspective" by Maurits Lindström, and "Mountain climatology: Status and prospects" by Roger Graham Barry.

Four papers consider the biota of the Arctic: "Soil biological processes in the North and South" by O. W. Heal and W. Block, "Plant population processes in arctic and boreal regions" by T. V. Callaghan, "Environmental controls over growth of tundra plants" by F. Stuart Chapin III, and "The nunatak theory reconsidered" by Eilif Dahl. The volume concludes with "Human influence on vegetation in the Torneträsk area during the last three centuries" by Urban Emanuelsson.

Most of the articles, such as those by French, Barry, Heal and Block, Callaghan, and Chapin, are useful summaries of the current research in their respective areas of research. For instance, Heal and Block draw most of their material from the soil studies of the International Biological Programme (IBP), and justifiably state that the momentum in arctic soil biology developed during the IBP studies has not been maintained.

Chapin summarizes many of the plant-environment interactions he has studied with respect to short growing season, low light, water-logged soils, and low nutrient availability, and then goes on to examine the interyear productivity of communities versus that of individual species. Barry's article presents the recent advances in mountain climatology emphasizing the role of new technological achievements in remote sensing and other data-collection techniques.

Three of the papers focus on the Torneträsk region, which is appropriate for this 50th anniversary symposium. Lindström provides an authoritative overview of the formation of the bedrock of what is now northern Scandinavia. Although the paper provides an important review of the geologic processes that produced the regional bedrock geology, those facets of the physical geology that are of greatest interest to ecologists, namely their influence on the biota, are conspicuously absent.

Dahl's paper reexamines the problem of the amphiatlantic species distributions in light of new evidence of a North Atlantic land bridge during the Late Pliocene–Early Pliocene. The paper also presents convincing arguments for nunataks in the Norwegian mountains during the height of the last glacial interval based on knowledge of the physics of ice movement. This paper is much needed because the last major evaluation of the North Atlantic land bridge was prior to the general acceptance of continental drift at the 1962 symposium in Iceland (Löve and Löve, 1963).

Emanuelsson's paper is a fitting conclusion to this volume summarizing the cumulative influences of human and climatic changes in the Abisko region. He traces the history of reindeer husbandry, tree cutting, and the modern tourist industry on the major vegetation types. The paper documents that even in this time of general worldwide population increases, there are regions of the globe where the negative trends of environmental degradation are being reversed.

The general impression of the symposium is that although it had an impressive slate of participants to honor an historic event, the theme of the symposium was overly broad and could not be addressed properly with seven short papers. It is difficult to judge what the audience of this volume is supposed to be. The papers are all quite good, but it seems that they could be lost here. The papers dealing with the Torneträsk area are the most appropriate for a commemorative volume for the Abisko station, and one wonders if the entire symposium more effectively could have focused on local research.

REFERENCE CITED

Löve, A. and Löve, D., 1963: *North Atlantic Biota and Their History*. New York: Pergamon Press. 430 pp.

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ARCTIC AND ALPINE FUNGI—2. By Gro Gulden and Kolbjørn Mohn Jenssen. Oslo: Soppkonsulentene, 1988. 59 pp. NOK 210. \$31.76 + postage. (Soppkonsulentene, Wesselsgt. 3, N-0165 Oslo 1, Norway.) ISBN 82-991301-1-5.

This is the second volume of a series of fascicles (a collection of individual descriptions of fungi on stiff paper). It is similar in every way to Volume I (see review in *Arctic and Alpine*

Research, Vol. 18, No. 4, 1986) with a detailed description, ecological information, important anatomical details, and a color photograph of each of the 25 species. The 15-by-25-cm size and waterproof, transparent, plastic cover make it possible to carry in the field. The close-up color photography once again ranks as some of the best color photography of fungi I've seen. Salient taxonomic characteristics are visible in the pictures which are taken in the habitats where the fungi grow. Following the introduction, genera not previously covered in Volume I are discussed with regard to the number of arctic-alpine species, the role of the species, and the known distribution. Eleven of the twenty-five species are now known to be in North American taiga and tundra habitats. I suspect that at least six or seven more will be found in the North American tundra since collecting has been lacking or only superficial in many areas.

It is interesting that *Calocybe onychina* has a pileus coloration which is phenotypically brown and much less purple-brown than populations which I have observed in the boreal forest. The value of superior, close-up, color photography is apparent at once and alerts the investigator to the possibility of a phenotypically more variable pileus pigmentation in arctic populations of the species. In this regard the notes following many of the descriptions are invaluable in pointing out our similar, dissimilar, and closely related taxa. North American mycologists and arctic biologists will once again be pleased to see the continuation of this high-quality series of fascicles. It is a must for the library of all mycologists and those interested in alpine and arctic biology.

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INTERNATIONALES SYMPOSIUM ÜBER TIBET UND HOCHASIEN VON 8–11 OKTOBER 1985 IM GEOGRAPHISCHEN INSTITUT DER UNIVERSITÄT GÖTTINGEN. Vorträge und Diskussion. Edited by Matthias Kuhle. (Göttinger Geographische Abhandlung 81.) Göttingen: Verlag Goltze GmbH & Co. K.G., 1986. 248 pp. ISBN 3-88452-081-4.

This is one of two Göttingen volumes that reflect our increasing access to and interest in the high country of Tibet and Central Asia. One volume is directly concerned with the results of the joint German-Chinese expedition of 1984, whereas this volume is concerned with a domestic symposium on the subjects involved. Twenty-two papers and abstracts cover four main topics: glaciers and their fluctuations, the mass movement of glaciers and soils, the micrometeorology of the glaciers and deserts, and finally vegetation and culture. A very pleasant touch is the abstract by Noel Odell, who died in 1987 aged 96, recalling his 1925 speculations concerning a Tibetan Pleistocene ice sheet. These ideas have, of course, been taken much farther by the volume editor, M. Kuhle, and proving or disproving them is one of the exciting challenges in this growing region of research.

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