for anthophyllite, α = 1.598–1.674, β = 1.605–1.685, γ = 1.615–1.697, γ-α = 0.013–0.025; γ versus composition in chart form; for fayalite, α = 1.731–1.824, β = 1.760–1.864, γ = 1.773–1.875; α, β, γ, γ-α, and 2V versus composition in chart form. The collection and presentation of a large number of charts make this an excellent textbook for the student of the common rock-forming minerals. Charts and tables that relate variations in optical properties to compositional variation in a mineral series, such as garnets, the rhombohedral carbonates, the lazulites, olivines, staurolites, cordierites, epidotes, pyroxenes, amphiboles, mica minerals, and feldspars, have been obtained from the detailed researches of many scientists (177 references), but the coverage of the various mineral groups is specific in some places and general in others.

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Biological Research in Antarctica

Biogeography and Ecology in Antarctica (Junk, The Hague, 1965. 800 pp., $31.95), edited by J. van Mieghem and P. van Oye, is offered by the editors as ". . . a general survey of what has been done thus far in the way of biogeographical and ecological research . . ." in Antarctica. It comprises the third volume in the series "Monographiae Biologicae" concerned with the continents of the Southern Hemisphere, since in the editors' opinion, it was "thought essential to include Antarctica." It is one of six major reports on Antarctic biological research published since the International Geophysical Year of 1957 and 1958. The others are *Discussion on the Biology of the Southern Cold Temperate Zone* (Royal Society, London, 1960); *The Life Sciences in Antarctica* (National Academy of Sciences, Washington, D.C., 1961); *Proceedings, 1st Symposium on Antarctic Biology* (Hermann, Paris, 1964); *Discussion on Physical and Biological Changes Across the Antarctic Convergence* (Royal Society, London, 1964); and *Antarctica* (Royal Society of New Zealand, 1965).

The short preface contains general explanations, two of which bear noting. One, a statement that little has appeared in biogeographical and ecological research about Antarctica, is not in accord with the existing record of the Antarctic biological literature published since 1957. Moreover, several contributors to this volume also had papers in earlier publications. Then, although the editors speak out warmly on behalf of international collaboration, a basic tenet that has done much to facilitate research in Antarctica, what appears to be lacking for efficient coordination in closing the many gaps in our knowledge of Antarctic biology is international coordination and communication, preferably through the Scientific Committee on Antarctic Research and the appropriate Permanent Working Group. The introductory remarks are, in a measure, an unbalanced review of the history of the Antarctic and an unnecessary digest of the 18 chapters that constitute the sole basis for this volume.

The first three chapters provide the physical setting: Harrington on geology and morphology; Rubin on climatology; and Ostapoff on the ocean surrounding Antarctica. The materials in these papers are well organized and clearly presented; the data are effective because they are derived largely from significant and current findings.

A second set of papers treats the vegetation of Antarctica. Hirano's report on freshwater algae is a painstaking review of all the earlier literature, with many detailed tables and an extended appendix concerned with the taxa of Antarctic and sub-Antarctic freshwater algae. The treatment is largely systematic, with emphasis on geographic distribution; but the usefulness of the latter information rests entirely on the correctness of the taxonomy, and Hirano admits that some of the determinations may be questionable. His bibliography, 116 references, falls just short of recent ecological work by Goldman, Angino, and a number of other recent limnological field workers; his bibliographic citations lack references to pages and sometimes to volume. Dodge's six-page exposition on the distribution and origin of the lichen vegetation of Antarctica also lacks references. A serious and unexplainable gap in the overall presentation of Antarctic botany is the absence of information on Antarctic mosses and hepatics; these are extremely important elements of the cryptogamous Antarctic flora and visible constituents of the land vegetation and a veritable cosmos of terrestrial invertebrate life. These shortcomings suggest hasty preparation, but in view of the long delay between the receipt of the manuscripts and their final publication, they also indicate a lack of editorial coordination. Wace's discussion on the vascular flora is a generous 65-page contribution, notwithstanding the fact that Antarctica can boast of only two flowering plants. The author brings in much that is relevant in terms of world vegetation by summarizing the fossil floras, the existing and highly pertinent distributions of present-day genera of vascular plants in the Southern Hemisphere, and recent views on the theories of zonal distribution of Antarctic and sub-Antarctic vegetation. Sieburth, who draws largely on his own experiences and observations, provides a competent and knowledgeable review of microbiological research in Antarctica. Wace and Sieburth somehow managed to include addenda and thus bring their references up to 1964.

Chapters 8 through 12 deal with the marine invertebrates. The first of these, David's paper on Chaetognatha, is a concise, informative, and well-diagrammed paper that provides a systematic, geographical, and ecological treatment. Yaldwin's paper on decapod Crustacea, the second shortest paper in the volume, represents a fairly well done survey of the surprisingly sparse Antarctic decapod Crustacea fauna which, it appears, is distinct from the sub-Antarctic fauna. However, within the brief span of this paper, there are a number of editorial variants and a series of unnecessary abbreviations which are inconsistent with the brevity of the paper and the style in the rest of the volume. Powell, an acknowledged authority of the mollusks of New Zealand and the sub-Antarctic region, has contributed a useful and important summary of this large group of invertebrates and a number of maps that show various distributions. This 47-page report includes four and a half pages of references up to 1958. It omits Rehder's brief but pertinent summary of malacological research in *The Life Sciences in Antarctica* (1961), and leaves out references to various biogeographical provinces discussed by his countrymen, Dell (1962) and Pawson (1961). Vervoort gives a concise summary on the biology of epiplankton in the Antarctic Ocean in relation to the hydrology of the Southern

Ocean and a tabular listing of the Antarctic and sub-Antarctic pelagic copepods. Rogick's paper on Antarctic Bryozoa is a timely extension, up to 1962, of the distribution of Antarctic bryozoans beyond Cushing's very complete review (1943) on the "Discovery" collections. Rogick includes a table of bryozoologists and the sources of their collections; she has, in addition, carefully assembled bathymetrical and areal distribution tables. Her 12 pages of text are documented by a bibliography of 30 references. Rogick laments the dearth of ecologic information on Antarctic species and recommends the examination of existing collections of Antarctic mollusks, crabs, echinoderms, and the like, for additional new species, or for information on new distribution records. Mary D. Rogick died 24 October 1964; she was known as a most careful worker, an outstanding contributor to the study of the Bryozoa, and an artist in her own right.

Chapters 13 through 19 are on the terrestrial invertebrate fauna of Antarctica. In the first, Dalenius, an authority on the Acarina, provides a comparatively long and informative account on the systematics and distribution of the free-living and parasitic mites, including the marine species. In another entomological treatise Gressitt includes all the land arthropods and Insecta and many valuable and interesting field notes. The emphasis is largely ecological, with a wealth of geographical details and good notes on distribution. Gressitt also prepared a number of maps that show ranges of genera and species in the sub-Antarctic islands, and a table to the southernmost representation of insects by families.

Andriashev, in a comprehensive and authoritative review of the composition and distribution of the Antarctic fish fauna, deals principally with bathypelagic fish ("Little is known of the abyssal fishes of the Antarctic") and with the biological peculiarities and cold adaptation of various members of the Antarctic fauna. There is a short section on white-bloodedness of chaenichthyid fishes. Andriashev states that Soviet research on Antarctic fishes began in 1956, when the first extensive collections were made by biologists on the *Slava*, a Soviet whaling factory ship. He adds that, since that time, the principal collections have been made by the *Ob* in her annual cruises to Antarctica. The collections are quite large, and it appears that the Soviet ichthyologists have reported on their materials in a remarkably prompt manner. Such interest in the fish fauna of the Antarctic regions is in perfect agreement with the persistent aim of Soviet oceanography to seek out knowledge, both commercial and scientific, of the marine resources of all oceans.

Chapters 16 and 17 are devoted to the birds of the Antarctic. The first of these, by Prévost and Sapin-Jaloustre, is in French, and it represents the longest and most copiously illustrated paper (97 pages) in the volume. The illustrations consist of 36 photographs and numerous figures that give climatic, physiologic, and related data. The chapter deals almost exclusively with the true Antarctic penguins, the Adélie and emperor. "Antarctic birds," a chapter by Voous, is ". . . devoted to land birds," but these again are predominantly oceanic species. It is a systematic account of the various species, with notes on their migration, nesting sites, geographical distribution, breeding seasons, and feeding habits, and other background information, collated largely from the literature.

In the last chapter Ove Wilson discusses human ecology. Wilson is well qualified to write on the subject, because he was the medical officer on the Norwegian-British-Swedish Antarctic Expedition of 1949–1952, which served as a pre-IGY example for international cooperation. He gives us a careful and thorough review of just about all phases of the medical, psychiatric, and sociological factors that affect man in the Antarctic. These subject areas have been ingeniously brought out in the bibliography by arranging a total of 224 references under nine subheadings. The most astonishing facts brought out are that, despite certain anecdotal and empirical observations, there is no convincing demonstration that a definite physiological process of acclimatization takes place in a man who resides in Antarctica, and that the processes of reacclimatizing winter personnel after they have returned from the "White Continent" have not been investigated.

Biogeography and Ecology in Antarctica had its inception more than 3 years ago. Difficulties are apparent, most of which seem to stem from lack of strong or clear editorial control. For example, there does not appear to have been a proper exchange of outlines or of authors' lists among the collaborators; this may explain the regrettably patchy nature of the volume. Duplications and omissions could perhaps have been avoided, if those who work in closely related disciplines had been given an opportunity to review their colleagues' reports. There are a number of typographical errors and an uncertain use of English equivalents to which the reader can easily adjust—for example, the use of the French term *plancton*. The index lacks detail; separate indices to authors and scientific names would have been very useful. The endpapers might have been utilized to carry maps of Antarctica and a list of geograpical regions.

Despite these incidents attending its birth, the excellence of a few, and the reference qualities of the majority of the contributed papers will rate this volume high in the estimation of all serious students of Antarctic biology.

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Plant Tissue Culture

Proceedings of an International Conference on Plant Tissue Culture (McCutchan, Berkeley, Calif., 1965. 579 pp., $12.50) is a record of the conference which was sponsored jointly by NATO and Pennsylvania State University and held from 28 May to 1 June 1963 at the Nittany Lion Inn, University Park, Pennsylvania. The *Proceedings* were edited by P. R. White and A. R. Grove and published (by offset printing) jointly by the American Institute of Biological Sciences and McCutchan.

The conference, which was modeled after the "Decennial Review Conference on Tissue Culture" (Woodstock, Vermont, 1956), was called to give attention to the many aspects of the field as well as to gather the many research workers scattered throughout the world who are utilizing tissue cultures as a research tool. Although the table of contents does not clearly show it, the 44 contributions were presented at eight sessions, and each session was followed by discussion. Efforts to make the conference international are apparent from the list of contributors. The articles ran from comprehensive ones with extensive bibliography to brief reports of activity within an investigator's laboratory. The following general areas are covered: cell, tissue, and organ nutrition; metabolism; histogenesis; morphogenesis; single-cell culture; genetics; cytology; and