

Book reviews

Antarctic valviferans (Crustacea, Isopoda, Valvifera): new genera, new species and redescrptions

Angelika Brandt

E.J. Brill, Leiden, (1990).

176 pages. Dutch Guilders 75. ISBN 90 04 09238 2.

This volume describes new species of valviferan isopods, and redescrbes some species already known, collected on cruises of RV *Polarstern* to the Weddell Sea and the Antarctic Peninsula from 1983–1987. In the opening introduction Angelika Brandt states that her taxonomy is based on the philosophy of Hennig, which is that only monophyletic taxa are allowed. However, her approach is purely descriptive, being based on traditional characters such as setae and spine distribution. Although there are references to a quantitative approach (for example, considering the variation in spine number and distribution between individuals of a species), there are no statistical analyses of characters. This is very much a traditional approach to descriptive taxonomy, with no hint of cladistics. It is therefore not easy to judge the extent to which one might agree or disagree with the author that the new taxa she erects are valid and monophyletic. Having introduced Hennig at the outset it would have been nice to see his approach to phylogenetic systematics put into practice.

Six new genera are erected (*Oxyarcturus*, *Chaetarcturus*, *Litarcturus*, *Tuberacturus*, *Mixarcturus* and *Fissarcturus*, all in the family Arcturidae). In this family, Brandt describes eleven new species and redescrbes a further ten. She also describes a new idoteid isopod, redescrbes a further six, and in addition redescrbes *Glyptonotus antarcticus*, synonymizing with the putative *Glyptonotus acutus*.

The illustrations are uniformly excellent and almost without exception are line drawings. The author has been well served here by the publishers who have reproduced the illustrations very well indeed. The text is arranged in strict accordance with the traditional layout of taxonomic works, and the language is also traditionally dry.

This volume thus follows Angelika Brandt's previous excellent account of the serolid isopods (*These Zoologicae*, Volume 10, Koeltz Scientific Books, Koenigstein, 1988). Both represent first class taxonomy in the old style, with no discussion of phylogeny, evolution or ecology. For these topics it is necessary to read Anglika Brandt's more general account of Southern Ocean isopods (*Berichte zur Polarforschung*, 98, 240pp. 1991) and it is a pity that this is not referenced. Nevertheless, this is an important contribution to Antarctic benthic marine biology and to isopod taxonomy in particular, and are essential purchases for any individuals

or organizations concerned with the benthos of the Southern Ocean. It is nice to know that someone is continuing with essential taxonomy, which is the lifeblood for marine biology.

ANDREW CLARKE

BIOTAS Manual of Methods for Antarctic Terrestrial and Freshwater Research

Edited by D.D. Wynn-Williams

Scientific Committee on Antarctic Research. Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER. 1992. 145 pages. £10. ISBN 0 948277 13 0.

In 1991, after lengthy discussions with SCAR, IUCN published A Strategy for Antarctic Conservation which calls for a strengthening of Antarctic science and its management through *inter alia*, long-term scientific strategy, measures to enhance the quality of scientific work, environmental monitoring, and research that contributes significantly to understanding of Antarctic ecosystems or of the global environment as a whole. The Biological Investigations of Terrestrial Antarctic Systems (BIOTAS), the International Research Programme (IRP) and the Manual of Methods are long strides toward those goals.

Needless to say, all Treaty nations subscribe to the concepts of protecting the environment and biodiversity, but each nation's efforts in those directions have had different scientific methods, different national regulations for environmental protection, and different arrangements for financial support. The character of biological and ecosystem research in Antarctica, especially in the extreme physical environments, and the need for long-term monitoring call for uniform or at least intercomparable methods. As an initial step for terrestrial and freshwater environments biologists of the British Antarctic Survey (BAS), proposed to SCAR a plan for establishing a biannual newsletter to provide fuller accounts of national programmes, international collaboration, notices of conferences, and items judged of interest to project leaders.

Antarctic biologists and scientists from collaborating disciplines (geomorphology, pedology, glaciology, etc.) have strongly endorsed the BIOTAS International Research Programme which has grown out of this improved communication network, noting especially the field reports with abstracts, details of instrument performance, specific taxa under study, details of the study sites and their protection status. The Newsletter is a continuing colloquium open to all project biologists and associates from collaborating disciplines. For Antarctic biological research to be maximally useful towards a continuing improvement of our understanding

of Antarctic ecosystems and contributions to knowledge of global systems, the research must be conducted by uniform methods or minimally by intercomparable methods, through appropriate space and time dimensions. To qualify as long-term research or monitoring, project data must be published in standard scientific journals or deposited in permanent files such as compact disks. Representative samples of whole organisms (e.g. herbarium sheets for vascular plants) or of dried or preserved tissues should be stored with properly curated collections. Microbiological cultures may be maintained for a number of years under proper temperature and humidity conditions. The Manual of Methods is the first step toward standardization of biological and environmental research procedures in Antarctic programmes, which is essential for building data bases on time series of biological observations to test for regional and/or global change.

The Manual of Methods format is 29.5 × 21 cm with binding margin punched for 4-ring loose leaf binder after the plastic back strip has been removed. Although soft bound, the front and back cover sheets are of plastic, resistant to moisture. Ring binder holes are intended to permit additions and replacements "to ensure its reputation as the current 'state of the art'". Each contribution (article) is page-numbered individually which allows for additions or replacements, but makes impossible a general index and a single series of page numbers in the table of contents. The contributions are grouped into more or less similar topics. The first five contributions are background and introduction to the BIOTAS Programme, for which the general theme is "Biological processes in cold environments", subdivided into three main research areas: life cycles, ecophysiology, and ecological interactions. Under the umbrella of the BIOTAS science theme, the focus of the International Research Programme is on "Colonization in Antarctic terrestrial systems." This general title is intended to include the subantarctic biome and inland water and littoral systems. The lead article discusses the selection of research sites in view of biogeographic factors, recognition of indigenous versus alien species, and relative isolation. The second article is an example of a research proposal for an Antarctic field project. A separate contribution on Antarctic meteorology is a brief list of recent literature sources. The next contribution is a very useful account of experience with data logger systems in the harsh environments. The next three contributions are reports of Antarctic field experiences with static and dynamic aerosol and aerobiota samplers, including high altitude sampling by aircraft. Field experiences documented by literature citations are offered as guidelines for sampling microfossils and microbial propagules in soils. Survival of aerobiota is treated with regard to colonization potential. Methods of fluorescent microscopy are presented for direct counts and viability of microbes. Detailed formulae for culture media are given for Antarctic yeasts, bacteria, and terrestrial protozoa. Helpful advice is provided for the identification of propagules of algae and lichens, and for

studies of terrestrial microarthropods. A contribution on plasmids in Antarctic bacteria suggests their possible use for detection of changing environmental conditions and applying "genetic engineering" to produce bacteria adapted to decomposing petrocarbon. Ongoing experiments on degradation of hydrocarbons in Antarctic environments are described in one of the contributions. Growth patterns in plants and microorganisms in different microclimates are described and another contribution gives specifics of assessment of growth and viability in plants by use of Calcofluor White M2R stain indicator applied in the field. Plastic cloches of various designs are being tested for manipulation of natural terrestrial environments at small scales.

A contribution on limnology describes sampling and chemical analyses of freshwater lakes by common methods, except that a petrol-driven ice auger is often required by thick ice and a large inflatable tent is needed to serve as a field laboratory for housing instruments such as UV-visible spectrophotometer. A contribution on assessment of environmental impacts provides examples of indicators or proxy indicators of impacts such as changes in soil pH, field fluorescence measurement of photosynthetic competence of the algal photobiont of lichens, and loss of polyhydric alcohols and sugars from lichens as indicators of stress.

In the barrage of methods recounted above, there is one the reader begins to look for: procedures for filing unpublished records and archiving documentary collections. A contribution to the Manual, "Bioinformation, data bases and networks for BIOTAS," lists data bases needed by BIOTAS members, including culture collection catalogues, bibliographic data bases, and regulatory data bases (e.g. regulations, directives, releases into the environment). Access by cross-referencing between biological and ecological data bases and between those and data bases for climatology and geology should be provided. These developments can be assisted by the International Committee for Data in Science and Technology (CODATA), especially through its commission on standardization of terminology for data bases in the biological sciences. Establishment of the BIOTAS International Research Programme was made possible and vital by convergence of several other developments. The IUCN strategy emphasized the requirement for coordinated biological investigations that would monitor introductions of alien species and track populations of indigenous species. The technology for Geographical Information Systems (GIS) is now usable in the field for precise location data in digital mode ready for computer processing. CD-ROM systems permit storage of enormous data bases on compact disks from which random access memory systems can retrieve stored data. Useful experience in coordinating methods and data handling was derived from the BIOMASS Programme (Biological Investigations of Marine Antarctic Systems and Stocks) 1978–88 convened by SCAR in collaboration with international unions engaged in biology of the Southern

Ocean.

BIOTAS and this Manual of Methods are results of initiatives by SCAR, its Working Group on Biology, and its Sub-Committee on Conservation. The present instar of the Sub-Committee is the Group of Specialists on Environmental Affairs and Conservation with a much expanded mandate. Special acknowledgement is due the biologists at the BAS who initiated BIOTAS and the IRP and convened the ad hoc groups of scientists to contribute from their research experience the protocols embodied in this Manual of Methods. Biologists and ecologists throughout the world will find inspiration in this approach to environmental protection, species conservation, and measurements of change in regional and global ecosystems.

WILLIAM S. BENNINGHOFF

Glaciers-Ocean-Atmosphere Interactions

Edited by V.M. Kotlyakov, A. Ushakov and A. Glazovsky
IAHS Publication No. 208, IAHS Press, Institute of Hydrology,
Wallingford, Oxfordshire, 1991.

549 pages, \$60.00. ISBN 0947571 33 7.

This book is compilation of papers presented at the International Symposium of the same title held at St. Petersburg, 24–29 September 1990. The aspirations of the Symposium were commendable and timely: to identify glaciological phenomena which have relevance to global climate change processes; and to identify those phenomena which may be indicators of global change and/or causes of large scale variations. Unfortunately these laudable aims do not extend to the book, which superficially at least is really just yet another conference proceedings. It is left to the poor reader to extract the highly relevant from the totally obscure, and like any such publication *Glaciers-Ocean-Atmosphere Interactions* has its fair share of both types of article. Where it does succeed is in the meeting of minds between scientists of 10 nations — though I guess I am really talking about the Symposium here — and in the reporting of modern Russian (especially) polar climate and glaciological science in an easily obtained publication.

A series of themes are regarded as important: ice coring to reveal paleoglobal changes of climate parameters, atmospheric chemistry, volcanic events; the role of glaciation in global sea fluctuations; complex analysis of sea ice and snow cover variations, and glacier mass balance fluctuations; snow/ice atmosphere interaction. The book is divided into nine chapters, each presumably based on sessions at the Symposium.

It is clearly printed from camera ready copy prepared in Moscow, though I personally find its typeface and design rather sober and respectfully suggest that its readability could be markedly improved by a more modern approach to typeset. However, this is nitpicking pedantry.

Many of the articles in the book suffer from one foreseeable

deficiency; a parochial knowledge of the relevant scientific literature. There are several examples of fragmentary reference lists, and one has the general feeling that the wheel is being re-invented time and time again. The sophisticated (and expensive) experiments described by Strakov concerning crystal alignment in sea ice are one such example, where no reference is made to corresponding laboratory experiments carried out in the West. There are other examples. This, of course, has been a serious problem for many years; I still remember with dismay the day I discovered that some of the 'unique' experiments in my Ph.D. thesis had in fact been done 10–20 years before by Russian scientists. With positive mental attitude it is fair comment to say that the more books of this kind that are produced the less this will be a problem.

Undoubtedly the main purpose of a book review is to advise potential customers whether to purchase or resist temptation. *Glaciers-Ocean-Atmosphere Interactions* is the kind of book that is extremely useful to have access to but one does not rush out and buy. There are some very good papers in it, and it gives a flavour of Russian polar climate and glaciological research, in particular, which would be difficult to match without some effort. My advice: buy your librarian a beer.

VERNON A. SQUIRE

Periglacial Geomorphology: Proceedings of the 22nd Annual Binghampton Symposium in Geomorphology: International Series, No. 22.

Edited by John C. Dixon and Athol D. Abrahams
John Wiley & Sons Chichester, 1992.

354 pages, £70. ISBN 0 471 93342 2.

This symposium volume highlights some recent North American contributions to periglacial geomorphology. The 14 chapters are divided roughly into alpine (8) and low-altitude, high-latitude locations (5). However, the first, by Colin Thorn, entitled, 'Periglacial Geomorphology: What, Where, When?' is an interesting, indeed provocative, general contribution. Thorn believes that the research area of periglacial geomorphology is beset by remnants of the climatic geomorphology approach which gives, 'an unsatisfactory blend of core concepts'. Thorn then approaches some basic notions in the subject using the 'geomorphic role of ground ice' as a unifying concept. This is a thought-provoking contribution — even if you do not necessarily agree with his views. Indeed, it could be read with profit by geomorphologists in general. It should be said that not all the subsequent contributions do follow Thorn's operational definition of periglacial geomorphology but this reviewer would not criticize them for that.

The paper by Clark & Hedges is the only one in the volume dealing with fossil forms, in this case the formation of

uplands in the Central Appalachians of the USA by cryoplanation. This term is much used in explanations of palaeo-landforms in temperate regions. However, I wonder if its use is, to follow a previous suggestion by Thorn about nivation, a 'geomorphic chimera'. The paper does show the need to be able to understand current mechanisms before we can really understand relict landforms. Fortunately, papers in this volume do attempt an understanding of the processes which have produced present-day landforms.

Most papers fall into the descriptive-analytical approach with several particularly useful contributions, e.g. the formation of season ice bodies (Pollard & van Everdingen), of 'palsas' and active layer landslides (Lewkowicz). Other papers report on monitoring programmes such as that on geochemical denudation by Nel Caine. Chemical aspects of periglacial areas have received less than their fair share of attention but these are clearly very important agents in mid-latitude mountains and Caine's contribution is most welcome.

The subject matter presented in this volume might restrict the interest for workers in continental Antarctica: most papers are more Arctic in context as well as geographical area. However, geomorphologists dealing with the Subantarctic islands will find something of interest, although there is little in terms of 'deep' theory in any of the papers presented here. Even the largely theoretical paper of Hallet & Waddington on buoyancy forces in the active layer is quite specific in application. Only Hall's contribution, a review of mechanical weathering and its controls in the maritime Antarctic, is related specifically to southern latitudes.

Practitioners will certainly find something of value but the mountain/lowland division seems telling in specifying interest in this book. Despite the 'international' epithet following the subtitle, this is a North American set of contributions with only one contributor from an institution beyond; potential purchasers should beware of this. Nevertheless, the volume is an important addition to the growing list of books on periglacial geomorphology—however you define periglacial.

W. BRIAN WHALLEY

The Log of the Scotia

William Speirs Bruce Edited by *Peter Speak*

Edinburgh University Press 1992.

306 pages. £85.00 ISBN 0 7486 0293 3.

The scientific achievements of the members of the Scottish National Antarctic Expedition, which sailed in the Scotia to the South Orkney Islands and the Weddell Sea in 1902–24, were second to none. They made extensive oceanographic observations, their biological collections were for a long time unmatched by any others and their meteorological observatory has provided continuous records up to the present day. Nevertheless, the expedition has been overshadowed by

others which set out at about the same time. It was not a contender for the Pole and suffered no disaster nor required dramatic rescue. Perhaps the character of its leader, W.S. Bruce, contributed most to its failure to receive proper recognition. A shy, retiring, man who pursued exploration and science regardless of personal fame, he was regarded as an outsider by the establishment in London and the Scotia expedition was finally almost entirely financed and staffed from Scotland—something which gave him, as an ardent nationalist, great satisfaction. It was characteristic that after the expedition his financial resources went into the publication of the six volumes of scientific results whilst his own log, intended to be the first of the series, took second place. However, it got some way towards publication and proofs corrected in his own hand were recently rediscovered amongst the Bruce papers in the Scott Polar Research Institute. Now, through the efforts and scholarship of Peter Speak, the log has appeared in worthy form after nearly 90 years.

It begins on February 2, 1903, approaching the South Orkneys and ends on June 10, 1904, leaving Ascension Island for home. The log records 'every event, scientific, social and personal' and much of it is concerned with the overwintering at Laurie Island. Inevitably, the daily reporting of routine tasks, valuable though it is for the historian, makes for some dull reading but the log conveys vividly the atmosphere of a small expedition in the maritime Antarctic. Bruce emerges as a leader who, whilst getting the maximum work out of his men, maintained a happy ship and inspired great loyalty and affection. The building on Laurie Island of Omond House, now preserved as a historic building, from local materials and such bits and pieces as could be spared from the ship was a magnificent achievement, providing solid and reasonably commodious accommodation for the observatory. Bruce's account, together with relevant documents which he carefully preserved, of how this facility came to be handed over to establish an Argentinian station in the middle of what was to become a British Dependency makes interesting reading in the light of subsequent events. The final cruise south (which discovered Coats Land) was late in the season and the Scotia was lucky not to be beset for the winter although Bruce regretted the breakup of the ice because it deprived him of a line of soundings on which he had set his heart.

The log is supplemented with introductory chapters by the editor and these, with Bruce's photographs and plans, add greatly to the value of the book. It is particularly illuminating to learn that the person who had most influence on the young Bruce was the polymark geographer Patrick Geddes, whose holistic approach to living organisms and the environment characterizes the outlook typical of Antarctic science today.

The Edinburgh University Press has taken much care to produce the book as it was planned by Bruce. The result is a handsome, if costly, volume which is an important and attractive addition to Antarctic literature.

G.E. FOGG

Satellite Remote Sensing of Polar Regions

R. Massom

Belhaven Press, London 1991.

307 pages. £39.50. ISBN 185293 1795.

The main objectives of this book, given in the subtitle "Applications, Limitations and Data Availability", make it clear that the book is not primarily a student textbook but more for applications in polar science.

The book is divided into two major parts of nearly equal length. The first part "Remote Sensing and Polar Regions" deals with the physical basis and the general description of remote sensing of snow and ice. In the introduction to this part of the book the need for a synoptic study of the polar regions is outlined. Satellite data hold the key to increasing our knowledge of these remote and infinitely challenging regions at a time when anthropogenic impact threatens as never before.

A deficiency of this first part is that the description of the physical principles of the remote sensing techniques is very short. For example the physics of the active microwave observations is summarized in only one page of text and one figure. The reader therefore will need a basic knowledge of the physics of remote sensing and radiation-ice interactions to interpret the results which come out of these techniques. However the main aim of the book is not to discuss geophysical processes observed by remote sensing techniques but to give an overview of the techniques themselves. The major focus of this first part is the description of the history and the development of satellite-borne polar remote sensing. The reader gets a detailed overview of the development, success and/or failure of the different satellite systems. The structure of this chapter is oriented on the different sensors or satellites which are treated separately. The visible and infrared applications are described in detail as well as the passive and active microwave applications. Another chapter deals with future developments — the Earth Observing System (EOS) polar platforms and possible laser altimeter techniques — but the details given are of necessity limited since some of the projects await final decisions. At the end of the first part of the book the data processing, archiving and dissimulation are described. It is clearly stated that the benefit of polar remote sensing techniques strongly depends on the archiving and on the easy accessibility of the data. The reference list to the first part contains the most important references in the field of polar remote sensing.

The second part of the book summarizes the technical details of 31 satellites or satellite series. For each satellite there are details of useful lifetime, orbital parameter, sensor characteristics, applications and, more important, limitations of the data for polar research, including format and availability. In addition references and important further reading are listed. This part of the book is of enormous value, especially for those readers looking for remote sensing data for special

applications in the field of polar remote sensing. Besides the general description of the sensors and of the missions the information about the data availability and archiving dates is of special importance. It constitutes one of the most complete summary of data archive addresses for earth orientated remote sensing applications.

The listings of satellite characteristics have only a very few errors, mostly related to very recent and/or planned missions. For these missions details in data handling and dissimulation might not have been agreed at the time of compilation.

In summary the book is a very powerful tool for readers who are interested in the applications of remote sensing techniques for geophysical research and in particular for polar science.

THOMAS VIEHOFF

Polar Stratospheric Ozone: Proceeding of the First European Workshop

Edited by J.A. Pyle and N.R.P. Harris

Report 34 in the Air Pollution Research Report Series of the Environmental Research Programme of the Commission of the European Communities, Directorate-General for Science, Research and Development. 1991.

306 pages. ISBN 2 87263 060 0.

This book is a series of short papers describing work presented at the First European Workshop on polar ozone depletion. In addition to fostering an exchange of scientific ideas, the objective of the workshop centered around planning for the European Arctic Stratospheric Ozone Experiment (EASOE), which took place in the 1991/2E boreal winter. This international programme focussed on obtaining a better understanding of the present and future potential for ozone depletion at mid- and polar latitudes on the Northern Hemisphere, obviously a subject of interest not only in Europe but also worldwide. The program clearly involved major scientific and logistical challenges in attempting to coordinate research among so many European nations, and this workshop was one of many steps involved in achieving a highly successful programme.

The workshop was divided into four primary sessions. The first dealt primarily with ground-based and balloon-borne methods to probe polar ozone depletion. Results and capabilities at principal sites (e.g. the well-equipped station at the Jungfraujoch) and available mobile instrumentation (e.g. lidar, ultraviolet/visible absorption, etc.) were described. The presentations demonstrate the considerable scientific expertise in Europe dedicated to these issues, particularly ground-based remote sensing measurements. This reviewer found two papers by Pommereau and co-workers regarding comparison of satellite measurements of total ozone using backscattered ultraviolet techniques and ground-based visible absorption especially useful and innovative. The papers by

Schiller *et al.* and Perner *et al.* regarding measurements of OCIO and BrO in north polar regions also provided key information for understanding Arctic ozone depletion and designing the EASOE campaign. The second session was directed towards laboratory measurements of key chemical reaction processes of importance to ozone depletion. Many of these papers were among those that have helped reduce uncertainties and sharpen the picture of polar ozone destruction chemistry over the past several years, particularly the work on chlorine oxide radicals by Cox and co-workers, Poulet and co-workers, Friedl and co-workers, and Simon and co-workers. There are also a number of intriguing suggestions regarding, for example, the use of the 30 m band for ozone sensing and possible sources of OCIO. The third session of the workshop focussed on the polar stratospheric clouds (PSCs) and mainly presented case studies of particular observation techniques (lidar, in-situ methods, UV/visible spectroscopy). The paper by Chanin and co-workers describing the use of rotational Raman lidar to obtain temperature measurements in the presence of PSCs addresses a key remote sensing problem. There are also several papers on modelling of PSCs that show the success of sophisticated numerical techniques at describing the PSC phenomenon.

The final session of the workshop presents more general modelling papers, including several that focus on photochemical processes including detailed three-dimensional treatments of atmospheric dynamics. Labitzke describes interannual variability in the Arctic stratosphere, obviously a critical issue for all studies of ozone depletion, and several studies are devoted to modelling the chemical variations that result: ozone "laminae", trajectories, tracer variance, the Noxon cliff, etc.

The volume thus presents a brief, but broad view of polar ozone depletion issues in Europe just prior to the EASOE campaign. The papers are too short to allow a detailed description of all of the scientific questions at hand, and many of them have appeared in expanded form elsewhere in the literature. Overall, this volume is interesting primarily for understanding the approach taken by the European scientific community to the remarkable task of organizing their thoughts and themselves for the purposes of attacking the ozone issue in a concerted fashion. For the non-European, it will also serve to illustrate the breath and depth of scientific capability in ozone research that existed in Europe before EASOE and has since grown even greater.

SUSAN SOLOMAN