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Book reviews

Iconography of Antarctic and Sub-Antarctic Benthic Marine Algae. Part II. Phaeophycophyta.

Jacques S. Zaneveld
Gustav Fisher Verlag, Stuttgart, Jena, New York, (1993).
128 pages. $94.00 ISBN 3 437 30709 6.

This book forms the second part of the intended trilogy "Iconography of Antarctic and Subantarctic Benthic Marine Algae". It comprises 98 full-page black and white photographs of herbarium species, including several type specimens. Forty-eight species are included in this volume. The species depicted are from collections covering the area from the southern tip of South America to the high Antarctic, and were made during early expeditions as far back as the French *Uranie* and *Physicienne* Expedition (1817–1820). The book contains photographs of the most common brown algae but does not include all Antarctic and subantarctic benthic marine brown macroalgae known today. About half of the 98 photographs (44) are from specimens collected during the British Antarctic *Erebus* and *Terror* Expedition (1839-1843).

Numerous taxonomic manuscripts about benthic Antarctic and subantarctic marine algae have been published but illustrations are usually lacking. The intention of the author was to make this material in European herbaria more easily accessible to investigators outside Europe.

The book includes a synopsis of orders, families and genera, a list of the herbaria visited, reference list, legend to the plates and the 100 pages of photographs. The legends to the plates provide information on location and date of collection of the specimen, on the collector, notes on nomenclature, who identified the specimen, present location of the specimen and finally references to the literature. Most photographs contain a scale in centimetres, original stamp of the herbarium where the specimens are stored and original hand-written annotations. A few drawn illustrations, probably the only available drawings, were added. The original annotations show that most of the algal material was found drifting in the sea or washed ashore on beaches. This explains the incompleteness of some specimen and the old and damaged parts of some of them. In a number of cases original hand-written annotations unfortunately are faded and illegible. For the specialist the photographs may provide a useful first idea on the state of the specimens. Although the photographs give an idea about what the macroalgae should look like, they can not be used for identifying species found in the field as different stages in growth, colour and cell structure are not included, not all known brown macroalgae are included and new species are still being found.

Keys to Antarctic and subantarctic macroalgae are scarce. This book might provide the non-specialist with a first impression of these 48 benthic brown macroalgae. The importance of this account lies in the historical value of the photographs and the reference list to the older literature.

PATTY BROUWER

Antarctic Meteorology and Climatology: Studies based on Automatic Weather Stations

Edited by *D.H. Bromwich* and *C.R. Stearns*
American Geophysical Union, Washington, D.C. (1993).
207 pages plus disk. $70. ISBN 0 87590 839 X.

The ten articles in this book (volume 61 of the Antarctic Research Series) include findings based on automatic weather station (AWS) data. The AWS unit is a 3 m tower equipped to measure pressure, air temperature, wind speed and direction, and at some locations, to measure temperature difference between two levels and relative humidity (i.e. a minimum of the required data for sensible and latent heat flux estimates. The data are received through ARGOS. The AWS system has been operational since January 1980, and as of July 1992 there were nearly 40 stations in operation. Through the years, the number of sites at which AWS have been installed has grown to 60 (only two failing to operate for a full year), thus matching the number of sites for which manned stations have provided at least one full year of surface observations. However, because the areal distribution of AWS is more widespread than that of manned stations (predominantly located at or near the coast), AWS data offer a better representation of the variety of climates found in the continent.

There are several findings of interest in each study, and in this brief review only one or two will be mentioned. A description of the AWS system and data access are covered in the first article which shows characteristics of the diverse climates found in Antarctica (Stearns *et al.*). The four articles that follow concentrate on katabatic winds, all of which demonstrate the usefulness of having AWS installed in arrays. Two of these studies provide an understanding (i) of boundary layer and hydraulic jump phenomena in the Adélie Coast sector (Wendler *et al.*), and (ii) of relationships between intense winds and a laterally confined low-level jet in the Terra Nova Bay region (Bromwich *et al.*). The other two offer insights on the dependence of intense flow along the major valleys in the Transantarctic Mountains on the supply of radiationally cooled near-surface air over the plateau (Breckenridge *et al.*), and of steady flow over long distances across the Ross Ice Shelf on persistent air drainage from southern Marie Byrd Land (Carrasco & Bromwich).

Five other articles close the volume. Estimates of sensible and latent heat flux for six locations on the Ross Ice Shelf contribute a large part of the relatively few estimates available

for Antarctica (the data are offered in ASCII format in an enclosed disk) (Stearns & Weidner). Studies of coreless winter climatology in the Adélie Coast sector (Wendler & Kodama) and of the variation of aerosol concentration at the South Pole (Hogan *et al.*) lead to inferences on different aspects of cyclonic activity. Data summaries describe the climate near the air-rock interface that provide part of the explanation for the development of cryptoendolithic communities (McKay *et al.*). Analysis of monthly surface pressure and temperature anomalies based on data from over 20 manned stations covering roughly 30 years of observations indicates a sign change of annual pressure and temperature anomalies between the year preceding and the year following Southern Oscillation Index minima (Smith & Stearns).

Everyone interested in Antarctic weather and climate will find this volume stimulating and informative. It will be most useful, firstly, to those who are interested in katabatic flow phenomena, and secondly to those who are interested in sensible and latent heat fluxes. This is not to say that the other articles in the volume lack merit; the AWS data serve many widely different interests, and the collection of topics show it.

After reading the volume, one may ponder if the installation of a station at Mt. Siple (February 1992) presages the installation of a couple more in the Amundsen Sea–Bellingshausen Sea sector. There is a critical need for data from that region. One may also wonder what might be the future direction of the AWS program given advances in remote sensing of surface temperature and wind (e.g. Nimbus-7 THIR and DMSP SSMI data). Clearly AWS remain irreplaceable for moisture and energy flux studies, microclimatological observations, and support of flight operations.

MARIO GIOVINETTO

Marine Mammals: Advances in Behavioural and Population Biology

Edited by *I.L. Boyd*
Oxford University Press, Oxford, UK (1993).
404 pages. £55. ISBN 0 19 854 069 8.

While reading the volume, I came to the conclusion that every student or prospective student of marine mammals should have ready access this book. It is diverse and comprehensive. There is something for everyone - from the generalist to the specialist, molecular biologist to whole animal zoologist.

The book is divided into three major topics: I. Genetic identity of stocks, II. Foraging ecology, and III. Physiology and bioenergetics. Categories are balanced with seven papers under I, eight under II, and five under III. Papers range from original journal style data presentations to reviews.

The introductory chapter by Boyd is one of the best reviews of the history of marine mammalogy that I have read. Section I contains reviews of the application of molecular genetic techniques such as DNA fingerprinting to determine relatedness, as well as the analysis of rare ecological events that have a profound effect for local populations.

Section II shows how the study of foraging ecology of pinnipeds has flourished over the past decade. Before the development of time/depth recorders, the major research activity on marine mammals was the study of breeding behaviour and social structure of those species that bred communally on remote islands. What marine mammals did at sea was an enigma. The guesses zoologists and physiologists made about those activities were often quite wrong. Studies of social activity ashore have now been eclipsed by studies at sea. The specificity of the studies has now evolved to analysis of intraspecific sex differences which, in the northern elephant seal, are substantial. Yet, in all the studies and the hundreds of thousands of dives recorded, the taking of prey has never been recorded or observed. Foraging activity is based on interpretation of dive profiles. Clearly this is a major gap in this field and several laboratories are striving to resolve this problem with research on various devices, ranging from monitors to detect mouth movement to video cameras mounted behind the head. Specifics about what marine mammals eat are discussed in two chapters, one presenting the conventional analyses of the bits and pieces found in stomach contents, as well as some not so conventional methods of analysing protein residues. The following chapter discusses in detail fatty acids as indicators of prey species. Both of these chemical assay methods have imposing technical problems to overcome.

As the book draws to a conclusion in Section III, with several chapters on energetics of foraging, contributions become more hypothetical and provocative. Discussions vary from the evolution of breeding patterns to how fast a marine mammal should swim to optimize hunting strategies. One may disagree with some of the conclusions, but every researcher should be stimulated to incorporate some of these problems into his or her own research.

Boyd has been able to assemble a group of well known authorities for this book. The result is a volume that is an essential resource for anyone serious about the biology of higher marine vertebrates.

GERALD L. KOOYMAN

Skua and Penguin: Predator and Prey

Euan Young
Cambridge University Press, Cambridge, UK (1994).
452 pages. £65. ISBN 0 521 32251 0.

Two qualities, especially, impress me about this book. The first is the length of time that transpired between data collection—five summer seasons at Cape Bird, Ross Island, from 1965–66 to 1969–70 —and appearance of the book. In this regard alone, the author deserves spirited congratulations. Many a long-term and/or in depth study of seabirds has failed to see fruition, i.e. the findings adequately shared in print. After 24 years of hanging around his neck, so to speak, the author must have walked at least a few meters above ground

on the day that this volume appeared and his responsibility to us was fulfilled!

The other noteworthy quality is the depth of analysis and the great level of detail that the author leads us through in his exploration of a) whether or not south polar skuas (*Catharacta maccormicki*) are scavengers or predators of Adélie penguins (*Pygoscelis adeliae*) during the breeding season and b) whether or not the skuas gain advantage by defending feeding territories comprising penguin sub-colonies *versus* just feeding at sea as some south polar skuas do all of the time and others do for the remaining 10 months of the year. At times, the level of detail and labour by which the author chaperones us through the thought process needed to assess these and related questions is painfully excruciating. Indeed, the first 200 pages are essentially details of methodology. On the other hand, if anyone is to duplicate or follow up this study with research on skuas elsewhere — and Young makes the case several times that this would be fruitful — then rest assured the required hierarchy of thought and procedure is contained in these pages.

On the basis of research preceding that reported in this book, in 1963, Young argued (*Ibis* 105: 301–318) that south polar skuas do not have a major impact on Adélie penguin breeding and that proximity of nesting between the two species was due to shared habitat preference. This, of course, was anathema to Antarctic folklore, so much so that Young undertook the detailed study reported in *Skua and Penguin*. His initial work was carried out at Cape Royds, but the inadequacies of that site to test these ideas further led him to the much larger penguin and skua colonies at nearby Cape Bird. In the modern world of grantsmanship, few of us ever undertake research to disapprove our hypotheses but, seemingly, this may have motivated Euan Young. Since his work, others including myself, through studies of skua diet and coincidence of skua and penguin colonies have indirectly confirmed his hypotheses. Perhaps persistence of the folklore, i.e. the skua being considered the "hawk of the Antarctic", was what propelled Young to publish his results after the 24-year hiatus.

So detailed and thorough is Young's analysis that the absence of two concepts surprised me. The first concerns the south polar skua's renown, at sea, of being a kleptoparasite of other seabird species. That is, the skua regularly robs other seabirds of their food by harassing them until they drop or regurgitate it. This is such a prevalent and important characteristic of this species at sea (see for instance, L.B. Spear & D.G. Ainley, *Auk* 110: 222–233, 1993; also, observations of kleptoparasitism of snow petrels *Pagodroma nivea* in Ainley *et al.*, *Amer. Ornithol. Union Monogr. No. 32*, 1984) that it would be surprising to me if skuas were not kleptoparasites of penguins when the two coincide on the breeding ground. However, never does Young consider this as a basis for the two species' relations and refers to kleptoparasitism only in the case of one skua robbing food from another skua. Thus, perhaps Young's question should have been: are skuas predators, scavengers or kleptoparasites of the Adélie penguin?

The second concept conspicuous by its absence, given the detail of Young's study, is the question of whether or not Adélie penguins benefit from skua kleptoparasitism (scavenging or predation) or from breeding within the territory of a south polar skua. This question was recently explored by L.B. Spear (*J. Anim. Ecol.* 62: 399-414, 1993) in his study of the analogous relationships between western gulls (*Larus occidentalis*) and its coincident breeding quarry, guillemots (*Uria* spp.) and cormorants (*Phalacrocorax* spp.). For instance, is disturbance less among the shepherded penguins compared to those penguins subjected to an uncontrolled, skua free-for-all? Does less disturbance insure that a penguin pair raises at least one chick to fledging (losing the other to the skuas)? By affecting even greater breeding synchrony among the penguins (demonstrated by Young's study), is this advantageous (other than greater breeding synchrony being an anti-predator strategy) or disadvantageous (for instance, with respect to greater competition for marine prey) to the penguins?

The one aspect of *Skua and Penguin* that was disappointing was the parochial grasp of seemingly related literature. For the most part, Young referred to his own or his students' studies on Ross Island and secondarily to related studies on Ross Island. Yet there have been at least three books/monographs, and a wealth of other literature, written on other skua species well before publication of this book. At the least, the point can be substantiated that the larger skuas play much more the role of a predator than does the south polar skua. It will remain for others to relate the findings of this book to ecological patterns elsewhere. On the other hand, this book is typical of most Antarctic biological literature, demonstrating again that the Antarctic Convergence is more than just an oceanographic barrier; it tends to be a barrier to information flow as well.

Certainly, anyone leading a natural history tour to Antarctica or anyone contemplating an ecological study of Antarctic penguins or skuas, of Arctic skuas, of kleptoparasitism, scavenging or predation among avian species, or of diet as a function of opportunism vs selection relative to food availability, must read and digest the findings of this book.

DAVID G. AINLEY

Hydrographic Atlas of the Southern Ocean

D. Olbers, V. Gouretski, G. Seiß and *J. Schröter*
Alfred Wegener Institute, Bremerhaven, (1992).
106 pages. ISBN (not specified).

Research in the Southern Ocean is demanding and expensive. The area involved is huge, there are still regions where data is sparse and even where it is available, the data is often of unknown quality. The position is improving slowly and the last two decades have seen a large increase in the number of good quality observations from the region. This change prompted the present authors to collaborate on a new atlas of

the Southern Ocean. They have produced an atlas of high quality, and although it has flaws, I think that it will become one of the classic atlases of the deep ocean.

In the present case the authors do an excellent job in checking the quality of the data. The tests used included T/S and T/O_2 scatter diagrams, static stability tests, detection of outliers and tests on the overall quality of stations and cruises. Out of 674 313 temperature-salinity measurements, 19% were rejected and out of 366 149 oxygen measurements, 8.5% were rejected.

To communicate the data previous atlases of the region have used hand contouring, the amount of data available not being enough for any other scheme. In the present case the extra data has tempted the authors to use optimal interpolation to produce a gridded data set. This is used to plot the temperature, salinity, density and oxygen content on thirteen levels in the vertical, on four density surfaces, on five core layers and at the ocean bottom. The atlas also includes steric anomaly maps and plots showing the property distribution on zonal and meridional sections. Seasonal maps showing the changes in surface properties are included for the Drake Passage and the Scotia Sea and for the region south of Africa. The atlas also contains information on the station positions and a set of transparent maps showing the expected error in the gridded properties at a number of levels.

As with previous atlases of the region, the data is still highly biased towards the summer months. Because of the errors this can introduce in the top 85 m, the authors have only used measurements made between December and March. At deeper levels the seasonal signal is smaller, a fact that is reflected in the smaller error fields.

The quality of the printing is good, colour is used to highlight the property distributions but unfortunately the range represented by each colour changes from one map to the next. The zonal and meridional sections use different horizontal scales, but within each group the scale used is constant and the top 1000m are plotted with an expanded vertical scaling.

I found the final product highly informative and at the same time extremely frustrating. It is the best atlas we now have of the region and with the new data available it appears to show clearly the effect of the mid-ocean ridges and features such as the Kerguelen Plateau on the circulation of the region. My frustration comes from the difficulty in identifying which of the smaller scale features of the maps are real and which are artifacts of the interpolation scheme. In studying the maps one has to make full use of the station position data and the error maps but even so it is still not obvious which features are real and which are noise.

As an example, at 4000 m in the South Pacific data is sparse and individual 400 km diameter anomalies are probably the result of a single observation. They may represent a single much smaller eddy, a western boundary current or a measurement error. Higher up in the water column similar scale anomalies are seen in the low salinity water encircling Antarctica at 750 m. Here the errors should be smaller but the anomalies look more like an artefact of the interpolation scheme than a real oceanographic signal.

The overall result is that although the data has the highest pedigree, the atlas itself is quite difficult to use. This is an important point for both the present atlas and for new ones being planned for the World Ocean Circulation Experiment. I think that it will not be enough to interpolate and contour the new data collected by WOCE. A lot of effort will also be needed to ensure that it is easy to use.

In conclusion, a highly recommended atlas but one which has flaws that should make us think more about what is needed in future.

DAVID J. WEBB

Short reviews

Cooper, J. & Ryan, P.G. **Management plan for the Gough Island Wildlife Reserve.** Government of Tristan da Cuhna. (1994). 96pages. No price indicated. ISBN 09 03359 38 3.

Gough Island is one of the few remote islands virtually unaltered by man and of great conservation importance. This new document provides both a detailed inventory and description of the island as well as very extensive management prescriptions. Nine appendices include a lengthy bibliography, existing conservation legislation, and a list of all recorded visits to the island. This management plan will be the basis of an application for World Heritage status for the island.

Smith, T.D. **Scaling Fisheries: the science of measuring the effects of fishing 1855–1955.** Cambridge University Press, Cambridge, UK. (1994). 392 pp. £50. ISBN 0 521 39032X.

Whilst the contents of this volume seem at first scarcely relevant to present Southern Ocean fisheries there are clearly important lessons that can be learn from a critical appraisal of historical successes and mistakes. Whilst there are *c.* 20 pages on whaling, the real value of the volume to CCAMLR scientists lies in its identification of the need for a research agenda "independent of the management needs of the moment, and of the personal agendas of individual researchers, which would demonstrate the true underlying causes of the fluctuations in the fisheries". Are we really any closer to this now than we were in 1955?