Although research on the basic anatomy of pinniped reproductive systems is reasonably well-understood, variation within and between species is less well-documented. Further, recent years have seen advances in reproductive biology that enable a more in-depth knowledge to be gained. Chapter 12 begins with a summary of the reproductive cycles of the seven Antarctic and sub-Antarctic species, and goes on to describe recent developments in DNA fingerprinting that enable a pup's parents to be identified. These data will allow the genetic structure of a population to be determined. Similarly, enzyme immunoassays are now readily available, and diagnostic kits are produced that allow accurate and simple measurement of hormones in the field. Other recent research has suggested that there are several relatively discrete populations within some species of seal, which is important to bear in mind when devising strategies for the effective management and conservation of Antarctic pinnipeds. Various methods available to assess the genetics of populations are listed in chapter 9, including electrophoresis of proteins, amino-acid sequencing, and immunochemical comparisons.

The study of the bioenergetics of a species can enable quantification of many aspects of its life history. Methods available include assessing changes in the weight and structure of the body over time, changes in the rate at which substances are turned over within the body, and the amount of oxygen used and carbon dioxide produced by aerobic metabolism. Pinniped bioenergetics is a fairly new field, but can provide answers to a variety of questions pertaining to their basic biology: what is the resting metabolism of animals of different ages? what are the costs of reproduction for males and females in terms of energy used to defend beaches and harems or in lactation? what is the level of parental investment? how much energy is used for feeding and foraging? do these change with seasons? Different methods and techniques that are available to answer these questions are evaluated.

The morphometric analysis of a species can yield information on areas such as age determination, reproductive status, and general population ecology. Chapter 8 details some of the measurements that can be taken with a view to standardizing collected data. This has been a problem in pinniped biology – especially in taxonomic studies – since many of the older papers do not define their datum points. So, for example, 'skull length' can mean condylobasal length, or the basilar length of Hensel, or even another measurement known only to the author. These discrepancies mean that data presented in the literature have limited value for comparative studies and are potential causes of taxonomic chaos. In 1967 the Committee on Marine Mammals defined some body and skeletal measurements in an attempt to standardize data collection (Scheffer 1967); although many researchers adhere to these standards, they are by no means used universally. Hopefully, the importance of the standardization of data collection stressed throughout *Antarctic seals* will yield more favourable results for the future.

The determination of the age of pinnipeds was developed independently by Scheffer (1950) and Laws (1952), and is essential in assessing pinniped population structures. Chapter 11 provides comprehensive information on the different dental structures of the seven species of Antarctic seals, as well as useful comparative data on the choice of tooth to be used for age determination and the variation in dental microstructure, both of which differ between species. It also discusses the reliability of the aging of cementum and dentine from different species at different ages. For example, counting canine cementum lines is adequate to age Weddell seals, but cementum is poorly developed in Ross and crabeater seal canines.

In conclusion, the great value of *Antarctic seals* lies not only in the vast amount of information it contains, all presented in a scholarly, comprehensive manner, but also in the fact that, for the first time, guidelines are presented so that data on pinnipeds may be collected systematically. Adherence to the suggestions and outlines presented by the various authors in their capacity as members of SCAR's Group of Specialists on Seals will allow comparisons between studies to be made, and open the way for more collaborative research between countries and individuals. It is impossible to over-emphasize the importance of this book, not only to the study of seals in the Antarctic and sub-Antarctic but to marine mammal research in general. (E. Cruwys, Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ.)

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SILAS: THE ANTARCTIC DIARIES AND MEMOIR OF CHARLES S. WRIGHT. Colin Bull and Pat F. Wright (Editors). 1993. Columbus: Ohio State University Press. xxx + 418 p, illustrated, hard cover. ISBN 0-8142-0548-8. US$59.50.

Few polar expeditions can lay claim to so great a wealth of literary talent as Scott's last. The leader's own posthumously published journals along with Cherry-Garrard's *Worst journey in the world* are both classics. Other members were likewise not wanting in this faculty; Priestley, Lieutenant Evans, Ponting, and Griffith Taylor all published narrative accounts. The subsequent publication of Edward Wilson's journals edited from the originals heralded a new genre exemplified in recent years by the edited diaries of Victor Campbell and Frank Debenham, neither accomplished literary gems but both valuable for their historical immediacy.

It is particularly gratifying to welcome to this growing library the diaries of Scott's talented and versatile young scientist, Charles (later Sir Charles) Seymour Wright. The editors are Dr Colin Bull (Dean Emeritus of Ohio State University and, like Wright, an experienced polar geo-

physicist and glaciologist) and Sir Charles' daughter Patricia (who, persuaded that her father had a tale to tell, encouraged him to help her transcribe his Antarctic diaries). By his own confession Wright 'never kept diaries except when it was necessary,' so that the end product proved too abbreviated, incomplete, and frequently commonplace to be considered for publication. Pat Wright at the same time assisted her father in the writing of a retrospective memoir (he boasted an excellent memory). Alas, he died in 1975, leaving it uncompleted. It is these two records, the daily diaries (plus some field notes) and the memoir, that constitute the core of the present volume. To this material has been added a series of letters written by Wright to his father in Toronto during the journey south. All this diverse material has been woven into a coherent whole under 17 chapter headings covering the principal events on the expedition in which Charles Wright played a part. Each chapter is introduced by a linking text. There are no footnotes as such, and explanatory matter and comments follow the relevant diary entries. To distinguish between diary and memoir extracts and editorial matter a system of differing type faces and marginal indentations has been employed, which some readers may find confusing. Finally, Pat Wright, herself a talented artist, has embellished the text with numerous delightfully executed and well-researched black-and-white sketches.

In his introduction Bull reminds us of the events leading to Wright's appointment to the Scott expedition as chemist and physicist. At the time he was a bright young Canadian '1851 Exhibitioner' studying under Professor J.J. Thompson at the University of Cambridge's Cavendish Laboratory. Griffith Taylor, also up at Cambridge, encouraged him to apply. The first time round he was turned down. The second time, after walking the 50-odd miles to London with Taylor to talk to Scott and Wilson in person, he was successful. Unfortunately, no contemporary record of this interview survives.

Wright's account of the *Terra Nova* expedition as told in the pages that follow can in no way be seen as the work of a poet, artist, or visionary. Wright was young, bursting with energy and ambition, and anxious to get into the field. His main sphere of interest was the study of penetrating radiation, but once on the ice he found himself immersed in all manner of other speculations and investigations — not least in the then novel field of glaciology. Little wonder that there was scarcely time to comment on personal or domestic affairs or on the overall progress of events. Of course, on the long voyage south there was time to spare, and in his letters home we have some worthwhile accounts of life on board ship and some pithy and lighthearted appraisals of his shipmates. Captain Scott 'has a thirst for scientific knowledge that cannot be quenched'; Bowers (responsible for dubbing Wright 'Silas') 'gets sunburned even if it rains or is clouded over'; Wilson 'has no peculiarities save that of teetotalism'; and so on. A thumbnail sketch of the visit to South Trinidad related how Wright, alongside Bowers, was appointed 'bugologist' despite a mutual arachnophobia. At Melbourne, Wright heard of Amundsen's volte-face, which he dismissed as 'a bit offside.' The near foundering of *Terra Nova* in the storm off Campbell Island was also typically low key; there is a diary version alongside the more leisurely memoir account. Delayed in the pack, Scott fretted while Wright found much to interest him in the forms and movement of floating ice. And so finally Ross Island was achieved, where Wright learned about photography from Ponting and then very soon found himself in the field attached to Taylor's reconnaissance in the Western Mountains, and, as he put it 'wearing the hat of glaciologist for the first time.' This chapter provides an interesting picture of Wright finally in his element and should be read in conjunction with the accounts given by Taylor and Debenham. The long Antarctic night spent at Cape Evans would have provided opportunities for journal writing, but again Wright was preoccupied with his scientific work — writing up field-notes, compiling maps, working on radiation, and helping meteorologist Simpson with routine observations, together with auroral and magnetic studies.

Fortunately for Wright, he was included on the 'Great March South,' and was able to carry out physiological work on the Beardmore Glacier. To his chagrin he never achieved the summit, being ordered back to Cape Evans as navigator with the 'First Return Party.' It is at this juncture that his normally unemotional diary entries flare up in anger. Teddy Evans, in earlier entries noted as 'wasteful and clumsy' and 'a quitter,' is now perceived as slacking in the traces while at the same time seeking to impress the 'Owner' with his expertise as a sledger ('the damn hypocrite'). Thus Wright was ordered back while Evans proceeded. A rare example of Wright losing his cool! Back at Cape Evans, Wright and his companions settled down for a second winter. The diary notes now became even more intermittent and abbreviated, dedicated largely to scientific observations, Cherry-Garrard being regarded as the 'responsible historian.' It was left to the memoir to supply any local colour. Despite the presumed loss of the Pole Party and the uncertainty as to the fate of Campbell's Northern Party, the little group at Cape Evans seems to have remained remarkably cheerful and fully occupied under the benevolent and relaxed leadership of Atkinson. Then, with the return of spring, a mule party set out in October 1911 in the hope of settling the fate of Scott's Pole Party. It was Wright's keen eye that spotted the snow-covered tent. The diary is brief and laconic: 'Found Owner, Bill & Birdie in tent....a damn fine finish.' The memoir recalls the event with some emotion: 'I felt much as if I were in a cathedral and found myself with my hat on.' The rest of the diary is anticlimax — an awaiting of the relief vessel. The memoir concludes the book with some of the author's thoughts on the reasons for the disaster and takes issue with Simpson on his theories concerning an unexpected drop in temperature on the Barrier.

In an epilogue, Bull provides an account of Sir Charles' subsequent career and a brief review of the several contributions made by him to the volumes of *Terra Nova* scientific reports, more particularly that entitled *Glaciology*,

written in conjunction with Raymond Priestley and subsequently to become a fundamental work of reference in this field. The publication of these diaries is a fitting tribute to a pioneer of Antarctic science. (H.G.R. King, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

THE STRUCTURE AND DYNAMICS OF ANTARCTIC POPULATION. Juan Carlos M. Beltramino. 1993. New York: Vantage Press. xvii + 105 p, illustrated with tables and maps, hard cover. ISBN 0-533-10205-7. US$16.95.

Knowledge about Antarctica is rapidly accumulating, but demographic research has not received much attention, even from the SCAR Working Group on Human Biology and Medicine. Data are not registered centrally by the UN or World Bank, which cover all other regions, and Dr Beltramino has done a service in writing this slim book that contains much of interest; the lengthy acknowledgements reflect the extensive correspondence that has been necessary to obtain data (to 1990) from all the countries involved. The author draws attention to the uniqueness of Antarctic demography, characterised by its international nature, the short residence times of individuals relative to other regions, the sex and age biases, the lack of natural increase, and the special nature of mortality. This means that full demographic procedure cannot be applied. Two chapters then describe the natural setting and the historical and political background; it is the one region on Earth that, for obvious reasons, never had an autochthonous population. Unfortunately, a table of historical events makes no mention of SCAR, which predated the Antarctic Treaty and has served it well, and Beltramino does not make clear the primary intention to create 'a continent for science.'

The remaining five chapters contain the meat of the book. The populations are broken down by wintering and summer, including tourism and small adventure expeditions, but largely omitting whaling, sealing, and fishing operations. The results are summarized in six maps, eight tables, and a number of additional tables in the text. Appendices list the primary data on wintering expeditions starting with *Belgica* in 1898; on scientific stations operating in winter, their location and breakdown by station and year; similar information about summer scientific and support expeditions; and mortality rates at scientific stations and on summer expeditions. The author emphasises the approximate nature of some of the data, which is beyond his control.

From the beginning of this century it took 50 years for the wintering population as a whole to reach 100, only a further five years to reach 500 (influenced by the IGY), and 80 years in all to reach 1000. Women increased from two in 1974 to 74 in 1990 (from only six countries and Greenpeace) and children from 14 in 1978 to 29 in 1990 (from only Argentina and Chile). The largest number of stations was present in the IGY. Summer populations are more difficult to establish, but the approximate totals are given; numbers increased from 75 in 1941/42, jumping to 6167 in 1956/57 representing IGY activities, and then increasing to 8340 in 1989/90. The number of women in summer increased from eight in 1947/48 to 260 in 1989/90 (from 14 countries and Greenpeace).

There are many other interesting points brought out by Dr Beltramino in his analysis. I would like to mention three. First, mortality rates: in wintering expeditions, almost all in the 'heroic era,' the rate 25.9 ‰; on scientific stations from 1904 to 1990, it was 2.5‰; and on summer expeditions 0.55‰. The causes of deaths in winter were 87% due to environmental hazards; in summer 61% to aviation accidents (greatly influenced by the 257 deaths in the crash on Mt Erebus in 1979) and 33% to other accidents, mainly involving air staff, seamen, and vehicles. Deaths due to medical problems are minor. Second, brought out clearly, is the very low winter density of people — a mere .000081/km^2 in winter (compared with a world average of 39/km^2). Third, meteorology is the predominant scientific discipline in winter, whereas biology is in summer.

This is a useful contribution, written in an engaging style, well-produced with clear maps, graphs, and tables, and commendably free of typographic errors. However, I must declare a prejudice against the irritating term 'wintering over'; why not the simpler 'wintering'? The author clearly defines his terms and draws attention to the deficiencies of the data. It is a worthy contribution to an emerging topic. (R.M. Laws, St Edmund's College, Mount Pleasant, Cambridge CB3 0BN.)

HIGH LATITUDES: A HISTORY OF SWEDISH POLAR TRAVELS AND RESEARCH. Gösta H. Liljequist. 1993. Stockholm: Swedish Polar Research Secretariat in collaboration with Streiffert Förlag AB. 607 p, illustrated, hard cover. ISBN 91-7886-102-0.

To the majority of English-speaking individuals interested in polar exploration, the period 1857 to 1859 is most notable for Francis Leopold McClintock's expedition in *Fox*, which helped finally to resolve the fate of John Franklin's Northwest Passage expedition. However, during the same years, a series of expeditions that have rarely even been mentioned in English-language books on polar exploration helped to lay the foundations for much of modern polar research. At the center of these scientific developments was Otto Torell (1828–1900), a Swedish glaciologist who was the first major figure to propose scientific study of the Arctic as a goal and not just an addendum to commercial or geographical investigations. Torell's expeditions to Iceland (1857), Spitsbergen (1858), and Greenland (1859) served as preparatory work for his leadership of the Swedish Arctic Expedition of 1861, which included nine scientists, among them Adolf Erik Nordenskiöld, Karl Chydenius, and Nils Dúner. The expedition had three main goals: interdisciplinary studies of Svalbard and the seas adjacent to it; a reconnaissance for establishing a triangulation network for future measure-