

## Reviews

**ENVIRONMENTAL CHEMISTRY AND CYCLING PROCESSES.** D. C. ADRIANO AND I. L. BRISBIN JR. (Eds.). (Available for \$15.00 from National Technical Information Service, Springfield, Virginia 22161 Request CONF — 760429)

This book contains 61 papers which were presented as a symposium in South Carolina. The categories treated are:

Design, Sampling, and Modelling	(10 papers)
Analytical Techniques	(11 papers)
Soils and Sediments	(14 papers)
Plant and Animal Uptake	(13 papers)
Terrestrial and Aquatic Ecosystems	(13 papers)

The editors have recognized the classical concepts of the physico-chemical separation of metallic elements, their concentration or depletion by geochemical processes and the modification of these cycles by organic activity. Unfortunately the preface and forward of the edition I reviewed were inextricably mixed up and the sequence and topics of papers didn't do much to relieve the confusion.

The first section (Sampling, Design, and Modelling) outlines the diverse sampling methods possible, and cautions against using linear models to study non-linear phenomena (most natural phenomena are non-linear). Release of trace metals during coal combustion and their subsequent redistribution in soil and plants, storage of nutrients in tundra ecosystems, and the cycling of nitrogen in a Douglas fir forest are all documented. There is a mathematical model to describe cycling processes and a model to simulate the geochemical behaviour of mercury.

The section on Analytical Methods contains case studies on arsenic and papers on methods of chemical analysis in the field or laboratory. Claims of detection of  $10^{-15}$  to  $10^{-19}$  gms for microbeam techniques are totally unrealistic. There are also papers on analytical techniques for radionuclides.

The soils and sediments section contains mostly case histories of accumulation and movement of metals in soil/sediment systems in tidal flats, swamps, lakes, estuaries and river beds. There are some interesting "before and after" studies which involve industrial installations. One study indicates that so called "safe" geothermal power may severely affect water quality because of the very high dissolved solids content of geothermal brines. The presence of "natural" sources of pollution (cesium in granitic rocks) is noted. Most studies show that soils, especially soils rich in clay minerals, have a tremendous capacity to absorb metal pollutants.

The section on Plant and Animal Uptake is concerned with the uptake, primarily by plants, of metal pollutants. The effects on plant growth of incorporation of fly ash in soils has also been studied. An interesting study uses the radioactive tracer technique to estimate the amount of caribou consumed by wolves in Alaska.

The final section deals with Terrestrial and Aquatic ecosystems. Some of the papers attempt to document the path of metal pollutants through a specific ecosystem, others deal with the rates of accumulation, decay, and dispersal of organic matter. The last three papers are experimental studies of oil spills, radionuclides contamination, and mercury pollution in aquatic environments.

While this volume contains some interesting studies, many of the papers are case histories which may not have broader significance. A few more papers with some fundamentals of both geochemistry and mathematical modelling would give the volume more universal appeal, allowing a researcher to design experiments and sampling programs relevant to his particular study area. The breadth of topics covered is impressive, reflecting the multidisciplinary approach of environmental sciences, but the separation of papers within the five topic areas seems somewhat arbitrary. The book does represent a very useful source volume for references up to 1976, but the rapidity of change in this field would require further searching for the latest information on a particular topic.

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**THE GANNET.** By BRYAN NELSON; *Buteo Books, P.O. Box 481, Vermillion, South Dakota, 57069, U.S.A. (Original publisher, T. & A.D. Poyser Ltd., 281 High St., Berkhamstead, Hertfordshire, England).* ISBN 0-931130-01-8. 336 pp. 62 Figs., 32 plates, 32 tables. \$25.00U.S.

To many, the Atlantic Gannet is our most magnificent northern sea bird. Its large size, dramatic facial appearance, densely-packed colonies and spectacular plunge dives stir the blood like few other birds. Now the Gannet has a fitting natural history to place it in proper pre-eminence. Bryan Nelson's book is a splendid account of over seventeen years field work on Gannets and their relatives. The book treads the fine line between excessively detailed presentation and unsupported

assertion with skill and firmness. The crisply-written text is admirably illustrated by John Busby and many maps, diagrams and fine photographs. The detailed support for the author's arguments is mainly provided by a series of appendix tables and each chapter is concluded by a useful summary.

In order, the book deals with the following topics: plumage, structure and voice; numbers and distribution; breeding behaviour and ecology; migration; the Gannet family and order and the relations between Gannet and man.

An adult Gannet's white plumage and streamlined shape are related to its far-flying habits and plunge-diving for fish. The near-black plumage of the mature juvenile may be a device to avoid eliciting attacks from the highly aggressive male.

The past and present world population size of the Atlantic Gannet are probably better known than for any other animal save man. The present population is concentrated in the north-east Atlantic, particularly north-west Scotland. About one seventh of the world population breeds in the St. Lawrence estuary at present, but Bird Rocks, Québec, once supported over 100,000 breeding pairs, before wanton destruction reduced numbers twentyfold. Since man stopped harvesting most of the world's gannetries in the early 1900's, numbers have increased about 3 per cent annually and many new colonies have been established. One of the most interesting points in the book is the effect of colony size on breeding success. In most large gannetries, over 70 per cent of pairs fledge their single young successfully, but in new colonies of a few pairs, birds rarely raise young. Such colonies therefore grow only by immigration from other colonies. However, when the colony reaches about 30 pairs, success improves dramatically to the level found in large colonies. Nelson argues that social stimulation from many colony members is a necessary condition for successful breeding. The continued increase of Gannet populations argues strongly that they are not food-limited, as does their ability to raise two chicks successfully if a second is experimentally provided.

After fledging, young Gannets are fully independent and move rapidly to warm seas, where they spend a year or more. They return to breed in their fourth or fifth year. Cape and Australasian Gannets are very similar to their North Atlantic counterparts and perform reverse northward migrations as young. Gannets share many traits with their more distant relatives, the boobies, notably many of their displays and the plunge-diving habit.

Differences in ecology can be explained by the lower productivity, and more marked seasonality of tropical waters.

Man's association with Gannets has been a richly complex, but mostly exploitative one. Some human communities, e.g. on St. Kilda, Scotland, have depended largely on Gannet chicks for food and Gannets are still harvested in Iceland, Scotland and the Faeroes. Pollution of the continental shelf areas used by Gannets may yet prove to be a more serious threat to the Gannet than culling. Low breeding success in the Bonaventure, Québec, colony, by far North America's largest gannetry, has been attributed to the effects of toxic chemicals.

This magnificent book is warmly recommended to all those interested in seabird biology.

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E.W. NELSON'S NOTES ON THE INDIANS OF THE YUKON AND INNOKO RIVERS, ALASKA. Edited and with an introduction by JAMES W. VANSTONE; *Fieldiana, Anthropology, Vol. 70; Field Museum of Natural History, Chicago, U.S.A.*; 1978. i-ix, 80 pp. 3 illustrations, 2 maps, notes, references, index. \$3.75.

E. W. Nelson was a fortunate young naturalist and ethnographer. Even though the Alaskan Inuit and Indians among whom he lived and traveled just about a century ago had been badly decimated by the smallpox epidemic of 1838-1839 and by other misfortunes, he was nevertheless able to attend an Indian Festival of the Dead on the Innoko River, to learn from the elders of Anvik about the winter festivals in that village and to observe other aspects of native life which are now totally gone. In November of 1880, Nelson set out from St. Michael where he had been stationed as a weather observer for the U.S. Signal Service since April of 1877. He traveled by sledge and dogteam along the lower-middle Yukon River and part way up its Innoko tributary. As VanStone explains, this kind of arduous journey had become almost routine for Nelson although almost anybody else would have counted it "remarkable".

The notes from the trip, which until this publication were only available in the National Anthropological Archives of the Smithsonian Institution, contain data not included in Nelson's major 1899 publication, *The Eskimo About Bering Strait*. The information is not only