

ATOLL RESEARCH BULLETIN

No. 70

Atoll News and Comment

Issued by

THE PACIFIC SCIENCE BOARD

National Academy of Sciences--National Research Council

Washington, D. C.

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ATOLL NEWS AND COMMENT

With this issue is started a series of informal articles by the editors of the Atoll Research Bulletin calling attention to expeditions to atolls and reefs, to record notes and observations that are too short to appear as separate numbers of the Bulletin, to call attention to and briefly review significant new publications, and to point out and emphasize important items from older publications pertinent to the modern study of coral atolls. The editors will welcome news notes, observations, and other items of interest that readers may care to send in, and will give the senders proper credit for any such used.

In the past the editors have gone to considerable trouble to ascertain correct addresses for people on the Bulletin mailing list who have moved or are reputed to have moved. We have decided that this is a fruitless waste of time. Hereafter, when a copy is returned the addressee's name will be removed from the list without further ado and will only be restored if he writes and requests it. This may make it possible to fill some of the many requests that must now be turned down.

ARB readers may be interested in the progress of the Pacific Science Board's Reef Terminology Index project. Since the Third Circular of the project, with a selected bibliography of the geological literature on reefs almost half of the papers on reef geology have been examined and about 1400 definitions and usages have been abstracted. The remaining geological papers have been assigned to members of the International Committee for examination. A bibliography of the principal papers on reef ecology, botany, and zoology is in preparation. The aim of this program is to bring together the terms in English applied to reef features, their original definitions and differing later usages, foreign language equivalents, principal genera of organisms found in and on reefs and atolls, locations and brief characterizations of classical reefs, and any other information that will possibly lead to clearing up the mess in which terminology referring to reefs and atolls finds itself. Cooperation on this project is earnestly invited. Correspondence may be addressed to the ARB editors.

We are glad to bring to the attention of the readers of the Atoll Research Bulletin the International Institute for Submarine Research, Vaduz, Liechtenstein, with its floating biological laboratory, the research vessel "Xarifa". This vessel is equipped to carry eight scientists and is fully self-contained and capable of carrying out many types of marine biological research as well as other types of scientific work on islands and coast-lines that are hard to reach by ordinary means. In 1958, work was carried out in the Maldives, and future programmes call for work out of northern Australia into the Molucca, Philippine, and Caroline Islands. Cooperation is invited from other interested institutions in expeditions on a semi-annual and annual basis. The president of the Institute is Dr. Hans Hass, the scientific director, Dr. Irenäus Eibl-Eibesfeldt. They are supported by a Committee for the Exploration of Tropical Seas and Islands, made up of internationally known scientists from the fields of Zoology, Anthropology, Ethnology, Geophysics, Paleontology, Geology, and Botany.

The Pacific Naturalist, published by the new Beaudette Foundation for Biological Research, Box 227, R.F.D. 1, Solvang, California, U.S.A., is the latest addition to the assortment of journals in which the results of research on coral atolls may appear. This serial, of which five numbers have appeared since its initiation, Dec. 17, 1958, is handsomely printed, beautifully illustrated, and will appear irregularly as a medium for publication of the results of the work of the Beaudette Foundation. We take occasion to welcome this new institution into the Pacific science community, and hope that its "program of inquiry into the systematics, distribution and utilization of marine and littoral organisms, particularly the plants, of the eastern tropical and subtropical Pacific" may prosper. The first five papers, including the one reviewed below are a good start. The president of the Beaudette Foundation is Palmer T. Beaudette and its scientific director is our friend E. Yale Dawson.

Mr. Bernd Lambert, of Sydney, Australia, writes that he will leave shortly for approximately 13 months of anthropological field work in the northern Gilbert Islands under a grant from the Tri-Institutional Pacific Program.

Recent Expeditions to Atolls

While it is probable that the resident scientist, in any region, may eventually achieve deeper understanding of his environment than does the expedition scientist, the geographical facts of life seem to indicate that most scientific work on coral atolls will, for some time to come, be done by expeditions. The very limitation of time inherent in expedition work may well have its beneficial aspects. The knowledge that time is limited, the novelty of the situation, and, often, the company of the members of the expedition may all have the effect of stimulating the expedition scientist, both mentally and physically, and on a successful expedition a prodigious amount of work may be accomplished.

Most readers of the Atoll Research Bulletin are either past or potential members of expeditions to coral atolls. They may be interested in brief notes about recent expeditions to atolls, the results of which are not yet available in published form.

Maldivé Islands: Dr. Georg Scheer writes that the Xarifa (see above) spent some months in the Indian Ocean, concentrating in this group of atolls, under the direction of Dr. Eibl-Eibesfeldt. Large collections of marine animals and birds were made and direct observation was carried out by means of under-water equipment.

Jaluit Atoll: After the visit of disastrous typhoon Ophelia, a Pacific Science Board expedition, under ONR sponsorship, spent a week on the atoll to study the effects of this typhoon. The party, under the leadership of David I. Blumenstock, consisting of A. H. Banner, F. R. Fosberg, J. L. Gressitt, E. D. McKee, J. B. MacKenzie, and H. J. Wiens, collected substantial amounts of data on what the storm did to the physiography, soils, fauna, flora, vegetation, and human life on the atoll. This will make a substantial contribution toward understanding the role of typhoons in the ecology and geomorphology of atolls in general. For a first preliminary announcement of results see *Nature* 182: 1267-1269, 1958.

Tuamotus: Dr. Jacques Barrau, Plant Introduction Officer of the South Pacific Commission, recently spent some weeks in the Tuamotus and is currently in Micronesia, where he has visited several atolls among the other islands. He is actively collecting and studying the forms of breadfruit in an attempt to understand the origin and migration of the many horticultural varieties. Important light may be shed on the pre-historic migrations of the Pacific peoples, in addition to solving the obvious botanical problems.

Clipperton Island: As an adjunct to the DOLDRUMS Expedition of the Scripps Institution of Oceanography last summer a party of biologists spent several weeks making a scientific survey on Clipperton Island, a ring-shaped coral island, like an atoll except for a snag of volcanic rock sticking up on one side. This island is of great interest in that it is one of the most isolated of all coral atolls and the only one in the eastern Pacific. Its biota is extremely impoverished. The ARB assistant editor was enabled to serve as botanist and geologist of the expedition through the kind invitation of Scripps Institution and financial assistance from the Joseph Henry Fund of the National Academy of Science. Some of the results may be expected in an early issue of ARB.

Canton Island: Under the auspices of the Civil Aeronautics Administration (now the Federal Aviation Agency) Dr. and Mrs. Otto Degener revisited Canton Island in early 1958 to inspect the results of attempts at revegetation carried out in 1950 and 1951 (see ARB 41-43). Part of the results are reported elsewhere in this issue.

Rongelap Atoll: During late February and early March, 1959, a Brookhaven National Laboratory party under Dr. Robert A. Conard visited Rongelap Atoll for the yearly examination of the Marshallese people who were affected by radioactive fallout in 1954. Dr. Baruch S. Blumberg, a member of the party, during his free time made valuable observations for the Pacific Vegetation Project in connection with the possible long-term effects of fallout on plants. The notes collected will be made available in this issue or the next of ARB. While on Rongelap the party enjoyed the company and cooperation of a party from the University of Washington Applied Fisheries Laboratory, under Mr. Edward Held, carrying out their semiannual resurvey of radioactivity under the AEC program. This has now evidently expanded to include serious work on the land environment, with investigations of soil radioactivity. Dr. Frank Richardson was studying the birds of the atoll.

Current Literature

Geology of Kapingamarangi Atoll, Caroline Islands, by Edwin D. McKee, Bull. Geol. Soc. Amer. 69: 241-278, 1958; and Sedimentary Belts in lagoon of Kapingamarangi Atoll, by Edwin D. McKee, John Chronic, and Estella B. Leopold, Bull. Amer. Assoc. Pet. Geol. 43: 501-562, 1959. It is a pleasure to be able to report two excellent papers embodying the final results of the geological and soils investigations made on the Pacific Science Board expedition to Kapingamarangi, 1954. In addition to what might be expected in geological reports, much information of an ecological nature, soil chemistry, a diatom flora, reports of pollen and dinoflagellates, and of recent foraminifera are included. Comparisons are made with geologically ancient reefs.

A Review of Ciguatera, Tropical Fish Poisoning, with a Tentative Explanation of its Cause, by J. E. Randall, Bull. Marine Sci. Gulf and Carib. 8: 236-267, 1958, will be of great interest to atoll students, as poisoning from eating reef fishes is a widespread hazard on atolls. Jack Randall has advanced what seems to be the first reasonable suggestion as to the cause of this poisoning. He suggests that the fish may acquire the toxin from eating blue-green algae that characterize the pioneer vegetation on newly denuded substrata. This would account for the seemingly inexplicable inconsistency in the toxicity of the same species of fish at different times and places.

Changes in Palmyra Atoll and its Vegetation through the Activities of Man, 1913-1958, by E. Yale Dawson, Pacific Naturalist, 1(2): 1-51, 1959, is a most interesting paper, handsomely presented. The destructive character of the influence of man is as appalling on Palmyra as in most other places. Interesting is the fact that interference with the circulation of sea water in and out of the lagoon resulted in complete destruction of the lagoon biota. The quick recovery of the land vegetation is a phenomenon also observed elsewhere on atolls. The complete lists of land and marine plants collected are valuable. Dawson also makes the suggestion that the pioneer blue-green algae, especially Lyngbya, have something to do with the sudden appearance in 1943 of Ciguatera or poisoning from eating reef fishes (see Randall article noted above).

Dating the latest movements of the Quaternary sea level, by Rhodes W. Fairbridge, Trans. N. Y. Acad. Sci. II, 20: 471-482, 1958, furnishes a welcome review of recent data on eustatic sea level fluctuations. An understanding of these fluctuations and their chronology and amplitude is a necessity to one who would think broadly on the theories of the origins of atolls, on their surface geology, or on their land ecology. Data on recent attempts to date some of the fluctuations by radiocarbon methods makes it possible to have a bit more confidence in actual figures on the postglacial lowerings of sea level that provided most of the land surface on atolls.

Flora of the Hall Islands, by Benjamin Stone, Pac. Sci. 13: 88-104, 1959, gives brief descriptions of the vegetation and a list of the known species of vascular plants of this group of atolls in the northern part of the Carolines. This paper will help materially in filling out the gaps in our knowledge of the Caroline atolls, mostly to date very poorly known.

The Ecology of Jamaican coral reefs I. Species composition and zonation, by Thomas F. Goreau, Ecology 40: 67-90, 1959, is comprehensive, well illustrated, and will contribute significantly to an understanding of the coral reefs and islands in the West Indies.

The Elepaio, vol. 19, no. 9, has two articles on atoll birds, an account of blue-gray noddies and of white throated storm petrels on Christmas Island, by M. D. Gallagher, and one of the old-squaw duck on Midway by E. H. Bryan. It is of interest that the nesting habits of the blue-gray noddy (Procelsterna) on Christmas do not match exactly those seen on Bikar and Pokak Atolls in the Marshalls.

It may be appropriate here to call attention to the many valuable articles on atoll birds and atoll ecology scattered through the 19 volumes of Elepaio. This publication of the Hawaiian Audubon Society must be regarded as an important source of information on atolls, especially the Hawaiian ones.

Coral Island, by Marston Bates and Donald P. Abbott, 1-254, Scribners, N.Y., 1958, is an example of popular science writing at its best. The authors give an informal account of the Pacific Science Board expedition to Ifaluk, a portrait of an atoll, an autobiographical account of scientists at work, and a liberal introduction to scientific natural history, in a book as easy to read as a light novel. Highly recommended reading is the chapter on The Reefs. Here is much of the essence of marine ecology. Here, also, is reassurance to the reviewer as to the adequacy of his education as a biologist--he has had the two requisites for its completeness, opportunities to study both coral reefs and tropical rain forests. Not the least of the virtues of this volume is the sharing with the reader of the authors' scientific philosophies.

Marine Ecology, by H. B. Moore 1-493, Wiley, 1958, is a comprehensive book, reviewing much of the important work that has been done in the field of marine ecology and boiling it down to the point where it is possible to assess the field. It is essentially a review, and throughout the text the sources of the material summarized are faithfully cited. For this very reason the book is really not very well adapted for use as a text book except for very advanced courses. It is not smooth or easy reading. Rather it is a compendium of information so arranged that what is available on almost any type of marine environment and its inhabitants may be readily located.

The coral reef environment is treated at somewhat less length than that allotted to some of the others, but the discussion is an important summary, emphasizing depth, light, and temperature limitations. Of especial interest is the attention given the zooxanthellae, or intracellular algae found in reef corals and other organisms. The illustrations of reef communities are especially striking, mostly taken from Manton and Stephenson's work on the Great Barrier Reef. Reefs such as those found in the Central Pacific that are largely algal in nature, receive scant attention.

The ecological framework around which the book is built is that of the marine environment, its subdivisions and its gradients. Ecological behavior, life histories, and differing requirements of larval and adult stages are properly emphasized. Analysis of data is done very thoroughly, synthesis scarcely attempted. Curiously, the term ecosystem is completely absent, nor is any equivalent used or proposed. Intracommunity relationships are discussed at length throughout the book, and dynamics are stressed here and there. The viewpoint, however, seems to be basically autecological. This seems true, at least if one regards the cited and quoted material as indicative, in spite of the fact that the author in his introduction emphasizes the necessity for integration (of the results of autecology and synecology). He even coins the term "integral ecology" for a third subdivision which he regards as coordinate with autecology and synecology. Perhaps some of his readers may fail to see the difference between "integral ecology and synecology".

One may also wonder if the author's question whether the autecologist's study of individuals can ever adequately describe communities as they occur under natural conditions, on p. 419, means that he thinks the ultimate objective of autecology is to describe communities. He also, on the same page, betrays some vagueness on the matter of what indicates that the community is more than the sum of its parts. No mention is made of effects caused by the community that could not conceivably result from its members separated in space or not organized in the way that the community is organized. Organization of communities is scarcely stressed at all in the book. Land ecologists will wonder if the lack of emphasis on climax and his statement on p. 420 that at no time are we dealing with a really stable climax condition is an indication of the author's bias or if such stability in communities as is observed on land simply does not exist in the sea.

Moore, in this book, has presented a magnificent accomplishment in bringing such a vast array of data into such order that it may be examined. Reef specialists will be disappointed in the scant attention given their part of the marine field. However, all of them will find the book extremely useful and interesting. Not the least useful feature will be the 27 pages of bibliography and the classified list of the genera referred to in the text.

It is a pity that as much cannot be said for the editing as for the compilation itself. Typographical errors abound, including some in the bibliography. For example Anton Bruun's name is spelled Braun on p. 211 and Bruan on p. 431. The most annoying thing of all, however, is the frequent reference to organisms by binomials with the generic name reduced to its initial. This is entirely proper if the genus has been spelled out earlier on the page, but in literally dozens or perhaps hundreds of cases one looks back a long way for the full binomial. For example, L. littorea on pp. 22 and 36 refers back to Littorina littorea on p. 21, although Lopholatilus and Laminaria are both referred to on pp. 21 and 22. In general far more familiarity with individual organisms is assumed than is warranted. This is partly offset by the list of genera of organisms referred to arranged according to the taxonomic system on pp. 421-428, with cross references from the index. Mention of this cross referencing scheme in the preface would have saved valuable time spent in discovering it. A glossary would have helped, especially where such words as "systrophe" (p. 153) and "implode" (p. 251) are used. However, far less unfamiliar words and usages are found here than is usual in ecological works.

Older Literature

It is interesting to note, on rereading Charles Darwin's description of Keeling Island in his Journal of Researches (London, 1839, pp. 539-553), that in addition to his many other great discoveries and generalizations he pointed out the essential principle of what has since been called the Ghyben-Herzberg fresh-water lens and that this was first noticed on an atoll islet. He says (pp. 545-546), "On this island the wells are situated from which ships obtain water. At first sight it appears not a little remarkable that the fresh water should

regularly ebb and flow with the usual tide. We must believe that the compressed sand or porous coral rock acts like a sponge; and that the rain water which falls on the ground being specifically lighter than the salt merely floats on its surface, and is subject to the same movements. There can be no actual attraction between salt and fresh water, and the spongy texture must tend to prevent all admixture from slight disturbances. On the other hand, where the foundation consists only of loose fragments, upon a well being dug, salt or brackish water enters; of which fact we saw an instance on this same island."

Additional note

A specimen of scarab collected on Male Atoll in the Maldive Islands in 1956 by F. R. Fosberg has just been identified by Dr. Oscar Cartwright, of the Division of Insects of the U. S. National Museum as Oryctes rhinoceros (L.), the rhinoceros beetle which destroys coconut trees. At the time this specimen was collected none of the characteristic signs of the ravages of this beetle were noticed in the coconut palms of Male Atoll, so it is probable that it had only been recently introduced. If this pest has become established in the Maldives it could prove to be a major disaster to the economy of the islands, which is largely dependent on the coconut palm. It is recommended that local authorities endeavor to determine if the rhinoceros beetle has become established, and that if it has vigorous efforts be made to eliminate it, before the infestation reaches major proportions. A campaign to destroy all dead palms and other decaying vegetable trash which might serve as a breeding place would be a good start.

Editors