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ATOLL RESEARCH BULLETIN

No. 108

Atoll News and Comment

Issued by

THE PACIFIC SCIENCE BOARD

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THE UNIVERSITY OF CHICAGO

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Atoll News and Comment

To keep our readers informed on current happenings of interest to students of coral atolls and reefs we offer another of this series. We will continue to welcome short items of current interest, or comments on overlooked or underemphasized past works, from any source.

Atoll Investigations

Displaced island communities:

Prof. Homer G. Barnett, of the Dept. of Anthropology, University of Oregon, has sent us the description of a five year project being undertaken by his department to make a comparative study of cultural change and stability in displaced communities in the Pacific Islands. This study will be primarily a historical study and will concentrate mainly on social effects, rather than the influences of the physical environment. "The project is conceived to be a study of cultural change within the context of an evolving continuum of community life." It is of particular interest to us because of the ten transplanted communities selected for study, five are atoll peoples. These are as follows:

- "1962-63. Field Director, H.G. Barnett
 1. Gilbertese relocated on Gizo Island in the Solomon Islands.
 2. Ellice Islanders relocated on Kioa Island near Vanua Levu in the Fiji Islands.
- 1963-64. Field Director, Leonard Mason.
 3. Bikini Islanders relocated on Kili Island, both in the Marshall Islands.
 4. Eniwetok Islanders relocated on Ujelang atoll, both in the Marshall Islands.
- 1964-65. Field Directors, James Spillius and H. E. Maude.
 5. Tikopians emigrated to Russell Island in the Solomon Islands.
 6. Gilbertese relocated on Gardner Island in the Phoenix Islands."

with regard to item no. 6, however, see ARB 100, p. 3.

Central Pacific Ocean Area:

The Pacific Ocean Biological Survey Program is being conducted by the Division of Birds, Smithsonian Institution, to satisfy a need for information on migration, distribution, and ecology of birds and terrestrial vertebrates, and their ectoparasites, in the Central Pacific Ocean Area (Hawaiian Leewards, Phoenix and Line Islands). Objectives will be achieved by carrying out a series of at-sea observations and field studies on selected islands. The project began in October 1962 and will run through December 1965.

A first product of this investigation is a report entitled "Preliminary biological survey of Sand Island, Johnston Atoll", 1-136, Washington, 1964.

Line Islands:

Christmas Island: Dr. Philip Helfrich, of the University of Hawaii writes, Oct. 23, 1963, as follows: "This past summer we spent some time on Christmas Island with Dr. William Gilbert of Albion College, Michigan. He aided us in an ecological study of the Cochrane Reef area and in addition, we collected numerous samples of the gelatinous algae that line many of the lakes. We also recorded the temperature and took salinity samples from 13 of these lakes. On many of the maps these lakes, particularly those in the southeast portion of Christmas Island, are marked "fresh water lakes." It is of interest that the salinity of these lakes ranged from 98.08 to 302.27 parts per thousand! I want to do some further elemental analyses of these samples and plan to report them in a note in the Atoll Research Bulletin." He was able, through the courtesy of the RAF, to photograph the study area, as well as other parts of the island from the air. It would be of great interest if these photos could be compared with those taken in 1936 of the atoll by photographers on HMS Achilles if these can be located. He also writes that Philip Ashmole is now carrying on the bird studies, originally planned then dropped (see ARB 84, 94).

Fanning Island: According to a report in Nature 200: 325-326, 1963, an expedition under University of Hawaii sponsorship made studies of certain invertebrate groups and their ecology on Fanning Island, between June 22 and Aug. 24, 1963.

Caroline Islands:

Nukuoro: Mr. Vern Carroll has returned from his expedition to Nukuoro (see ARB 100, p. 4) for the summer. Some of the preliminary results are presented earlier in this issue. He intends to return to the atoll for another extended period beginning this fall.

Indian Ocean:

Maldives: A small party, under the leadership of our correspondent, Dr. David R. Stoddard, of the Geography School, Cambridge University, is working on Gan, Addu Atoll, this summer, investigating sedimentation, wave and tide relationships, and beachrock occurrence and formation. The other members of the party are Dr. Peter Spencer Davies, ecologist from the University of Glasgow, Andrew Keith, geography student from Cambridge, and David Sigee, botany student, also from Cambridge. Recent political disturbances in the Maldives have unfortunately restricted the activities of the expedition to the immediate vicinity of Gan Islet and the lagoon, but we hope to be able to report significant accomplishments in a future issue.

West Indies:

Bahamas: Mr. John D. Milliman, of the Institute of Marine Science, University of Miami, is carrying on an investigation this summer on the marine geomorphology and hydrography of Hogsty Reef and Little Inagua Island, in the southeastern Bahamas.

Publications

Three recent reports that have come in are of particular interest to students of reef ecology. Dr. Tom Goreau has presented a detailed discussion of his work on "Calcium carbonate deposition by coralline algae and corals in relation to their roles as reef-builders" (Ann. N. Y. Acad. Sci. 109: 127-167, 1963) in which he describes in detail his methods, gives careful attention to rates of calcification, to the effects of light, the relation between calcification and photosynthesis in both algae and corals, and emphasizes this relation as a factor governing population composition and growth form of the hermatypic biota in the reef. Dr. Goreau and Dr. Willard F. Hartman have treated in detail "Boring sponges as controlling factors in the formation and maintenance of coral reefs" (Amer. Assoc. Adv. Sci. pub. 75: 25-54, 1963). They summarize what is known, and not known, of the mechanism of boring by clionid sponges, and survey their occurrence and erosional effects at different depths on the reefs on the north coast of Jamaica. This is one of the first papers treating in any detail the erosion that takes place on the parts of the reefs below effective wave action. J. E. Hoffmeister and H. G. Multer, in "Growth-rate estimates of a Pleistocene coral reef of Florida" (G.S.A. Bull. 75: 353-358, 1964) have used an interesting combination of experimental and observational data to arrive at estimates of the time required for the formation of a reef. The wide difference in estimates depending on the assumptions used indicates that there is not yet any very firm means of determining reef growth rates. This attempt is better than most in that it takes more of the possibilities of variation into account.

Pacific Basin Biogeography:

Students of Pacific atolls will welcome the publication of a volume of symposia on "Pacific Basin Biogeography", edited by J. Linsley Gressitt, published by the Bishop Museum Press, Honolulu (1963), \$12. Three of these symposia, treating the North Pacific (Bering Arc), Tropical Pacific, and South Pacific (Antarctic) relationships, respectively, present a comprehensive picture of what is presently known of the distributional patterns of Pacific plants and animals, projected against a background of geology and paleogeography. There is enough speculation, some of it quite unbridled, to make interesting reading. The fourth symposium is on "Modification of biotic balance of island faunas and floras". In several papers it presents some of the effects of man's presence on islands. The volume contains much of interest to all biogeographers and ecologists with any interest in islands.

Carnival Under the Sea:

Dr. René Catala is known to many ARB readers because of his fine research aquarium in Noumea, where one may study corals and many other reef organisms in comfort without even getting wet. Some may have seen his magnificent movies of undersea animals and featuring the beautiful fluorescence of corals, discovered by Dr. Catala. Now, for the stay-at-homes who cannot go to New Caledonia and see these marvels at first hand in the aquarium, Dr. Catala has written a book, mainly consisting of color plates of the inhabitants of his aquarium. This will be published this fall, in both English and French editions, by Editions Sicard, Paris. The English title is "Carnival under the sea", the French, "Carnaval sous la mer". A subscription announcement, with a sample plate, has been sent to all recipients of ARB. A few are still available from the ARB editors.

Coral Reef Biology:

Yonge, C. M., The biology of coral reefs, in: F. S. Russell, ed., *Advances in Marine Biology*, 1: 209-260, 1963.

In all active scientific fields, and more especially in such a period as the present with an enormous yearly volume of published work, frequent reviews are necessary to enable specialists to keep themselves oriented in their fields and in relation to science as a whole. When these reviews can be written by the acknowledged masters of the fields it is a great advantage. Such is that on coral reef biology by the dean of the workers on this subject, C. M. Yonge. This article is so well-conceived, and the material so well-selected, that it should be required reading for anyone interested in any aspect of coral reef geology or ecology. The author summarizes the systematics and distribution of the corals, then relates the origin of coral colonies by the settlement of planulae to some of the confusing difference in growth-form that complicates the classification. Then he summarizes, perhaps less adequately than in other sections, the ecology of atolls. The Atlantic reefs are given special treatment, comparing them with Pacific ones. A short summary of the erosional processes on reefs follows. A short section on physiology leads to a major treatment of the problem of zooxanthellae and their relation to the physiology of the coral animals, and even to the rate of skeletal formation. Interesting is the fact that zooxanthellae now seem to have turned out to be vegetative stages of planktonic dinoflagellates. Growth and the effect of light are treated. Finally, and of great importance in the ecology of reefs and atolls, the author summarizes what is known, and claimed, of productivity on coral reefs. Investigation of this aspect of coral reef ecology seems really only at its beginning. The six page bibliography is extremely valuable.

Heron Island, Capricorn Group:

Coral Cay vegetation, Heron Island, Great Barrier Reef, by Mary E. Gillham (*Proc. R. Soc. Queensland* 73: 79-92, 1963), is a very detailed account of the vegetation of the island briefly described in ARB 82,

and its environment, with an essay toward interpretation of successional trends and environmental relationships. A tabular list of species and a sketch map are included. The list includes five species not included in ARB 82, as follows:

Hibbertia sp.
A seedling of *Cucumis vulgaris*?
Vitex ovata
Achyranthes aspera
Poa annua.

Included are two species of *Pandanus*, both of which are considered by Fosberg and Thorne to be forms of *P. tectorius*, sensu lato. We do not know what *Cucumis vulgaris* is.

The Fosberg and Thorne list includes 38 species not in the Gilham list. Of these, 30 are pot plants or obviously planted, 6 are widespread weeds, and 2, *Commicarpa chinensis* and *Sophora tomentosa* are normal members of the strand flora.

Eniwetok Atoll:

We recently received an undated report entitled "A review of the ecology of Eniwetok Atoll, Pacific Ocean", by A. M. Woodbury, of the University of Utah. This brings together a good deal of information, not all of it pertaining to Eniwetok—e.g. a discussion of an epidemic among seals in Antarctica, and a list of medically important arthropods of Ponape. The vegetation is treated very casually, indeed, and the soils even more so. The section on birds is by far the most detailed, but even this is marred by careless errors and failure to distinguish between observations that apply to Eniwetok and those made of the same species elsewhere. Flagrant examples of this are the lists of bird parasites, which were taken from a publication on parasites of North American birds. However, if the report is read with these peculiarities in mind, it is a good source for general information on the land biology of the atoll.

Matters of General Interest

Lt. Col. R. B. Seymour Sewell:

Col. Seymour Sewell died in Cambridge on 11 February 1964, aged 83. Before the Second World War he had made major contributions to reef studies in the Indian Ocean, before retiring, in 1935, to Professor Stanley Gardiner's Department of Zoology at Cambridge. Gardiner and Sewell between them are responsible for the greater part of our knowledge of the Indian Ocean reefs, particularly those of the Maldivé Islands. Sewell's early training was in zoology and medicine, and he began his professional career in the Indian Medical Service in 1908. In 1910 his appointment as Surgeon-Naturalist to the Marine Survey of India led to growing interest in the Indian seas, particularly on the Burma coast and the Nicobar Islands, and then in the Maldives. His 1935 paper on "Coral and coral formations in Indian waters" remains a classic of reef literature. Before

it appeared he was appointed leader of the British Museum's John Murray Expedition of 1933-4, which in addition to the collection of geophysical and systematic data led to Sewell's own accounts of Addu and Goifurfehendu atolls, Maldive Islands, which still have few counterparts in the Indian Ocean reef literature.

Sewell was primarily a marine zoologist, and his major interest in the systematics of the copepoda is reflected in his fifty or so published papers. In his reef work he was influenced by Daly's and Gardiner's emphasis on recent negative shifts of the sea, which he attempted to synthesise and explain in 1928. He was not a trained geologist or physiographer, but rather, as his official title implied, a naturalist, with correspondingly wide interests; yet his reef work is full of acute observations on physiography and sedimentation. For the last few years he was immobilised in Cambridge by paralysis, but remained mentally sprightly, and indeed, within a few weeks of his death he was still working on data from the John Murray Expedition. Among other honours, he was President of the Ray Society (1950-53) and of the Linnaean Society of London (1952-55), and a Fellow of the Royal Society. Few specialists nowadays can hope to have the breadth of competence and accomplishment that Seymour Sewell had. His main reef papers were:

- 1928. A study of the recent changes of sea level based largely on the study of coral growth in Indian and Pacific seas. *Internat. Rev. der Ges. Hydrobiol. und Hydrogr.* 20, 89-102.
- 1932. The coral coasts of India. *Geographical Journal*, 79, 449-465.
- 1935. Studies on coral and coral formations in Indian waters. *Mem. Roy. Bengal*, 9, 461-540.
- 1936. An account of Addu atoll. *Scientific Reports, John Murray Expedition 1933-4*, 1, 63-93.
- 1936. An account of Horsburgh or Goifurfehendu atoll. *Scientific Reports, John Murray Expedition 1933-4*, 1, 109-125.

D. R. Stoddart

Heron Island Laboratory:

We had a recent brief visit from Prof. W. Stephenson, of the Zoology Dept., University of Queensland, who has been spending a year teaching in this country. He informs us that the Heron Island Laboratory now has five buildings completed, thus improving the already comfortable facilities for research at the south end of the Great Barrier Reef. Visitors from abroad are welcome and are encouraged to make use of this station (see ARB 82, 99). Prof. Stephenson is continuing his researches on the fauna inhabiting beach-rock.

Resolution on Leeward Islands:

At a recent meeting, the Hawaiian Academy of Science Council voted to refer a resolution, urging that control of the Leeward Islands

as a bird and wildlife refuge be retained by the Federal Government, to the membership. The text of the resolution is as follows:

"The Leeward Islands, a part of the Hawaiian chain which extends for about 1300 miles toward the northwest from Kauai, consists of several reefs and shoals, and of 9 islands and atolls: Nihoa, Necker, French Frigate Shoal, Gardner Pinnacles, Laysan, Lisianski, Pearl and Hermes Reef, Midway, and Kure. All of these islands, except Midway, became part of the Territory of Hawaii at the time of annexation. During the early part of this century, feather hunters decimated the bird populations on several of the islands, and on February 3, 1909, all except Midway and Kure were placed in the Hawaiian Islands Bird Reservation by Executive order of President Theodore Roosevelt. Kure was added to the reservation in April, 1909. Midway has never been a part of the Reservation.

The area set aside as the Hawaiian Islands Bird Reservation is today known as the Hawaiian Islands National Wildlife Refuge. Politically, these islands are a part of the State of Hawaii and of the City and County of Honolulu. The Refuge is in Federal ownership under the jurisdiction of the Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Department of the Interior. In accordance with an agreement between the State of Hawaii and the Dept. of the Interior, immediate administration is under the Director, Division of Fish and Game, Dept. of Land and Natural Resources, State of Hawaii. The funds for administration of the Refuge are given the State by the Dept. of Interior.

Recently, there has been a proposal that the Department of the Interior turn over ownership and control of the Leeward Islands to the State of Hawaii. In response to this proposal, the following resolution will be presented to the academy membership:

"WHEREAS the islands composing the Hawaiian Islands National Wildlife Refuge provide nesting sites for several species of sea birds, and in some instances are the major breeding sites of the species; and

"WHEREAS on these islands are found three species of birds, the Laysan duck, the Laysan finch, and the Nihoa millerbird, which occur nowhere else in the world; and

"WHEREAS these islands provide a refuge for the Hawaiian monk seal; and

"WHEREAS on these islands are found several species of plants which occur nowhere else in the world;

"THEREFORE the greatest scientific value of these islands lies in their continued use as a Wildlife Refuge; and

"THEREFORE, BE IT RESOLVED that the Hawaiian Academy of Science, at its annual business meeting on April 23, 1964, urges that the control of the Hawaiian Islands National Wildlife Refuge remain vested in the United States Department of the Interior;

"BE IT FURTHER RESOLVED that copies of this resolution be sent to the Secretary of the Interior, the Director of the U. S. Fish and Wildlife Service, the Governor of Hawaii, the Director of the State Department of Land and Natural Resources, and the Director of the State Division of Fish and Game."

In this connection see ARB 84, 94, 97, 98, 103, and a recent article by J. W. Aldrich, "The Gooney birds of Midway" (Nat. Geogr. Mag. 125: 839-851, June 1964). The killing of the albatrosses being carried out on Midway Island makes it even more imperative to preserve the habitats of the few of these birds that inhabit neighboring islands. We would have suggested **that** the resolution also protest the desecration of this wildlife refuge by the U. S. Coast Guard (see ARB 51, 78, 79, 94, 103) which seems to be exempt from the Fish and Wildlife Service regulations.