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ISLAND NEWS AND COMMENT

Readers will notice a neater format in this Bulletin. It is not a permanent improvement but is the result of very welcome, though temporary, help from the U.S. Air Force (AF/LGFC, Hq USAF). We owe the nice appearance of this issue to Mrs. Martha M. Green, of that Air Force unit, who did the final typing; our best thanks to her. This help bailed us out of a difficult situation for this issue. The next one will appear thanks to the Bureau of Sports Fisheries and Wildlife. After that we will probably be in trouble again. If any of our audience has any ideas on how we can get camera-ready copy typed on an "editing typewriter" or "word-processing machine," with no funds to pay for it, we would appreciate suggestions. We simply cannot handle the burden of repeated proof-reading of work done on an ordinary machine. We hope to get the production of the ARB back on a stable basis soon, but have had some bad breaks recently.

Since the last Island News and Comment appeared, the Island Bibliography Supplement, by Sachet and Fosberg, has been published (see under Publications). A leaflet has been sent to ARB readers to this effect. As there will be no further printed supplements to this volume, the section on Publications, Briefly Noted Items, will include lists of current publications on islands and reefs. Mrs. Linda Smith has volunteered to compile these lists for marine subjects and Dr Bryce G. Decker for terrestrial ones. Reprints and references sent to us will make this task easier and the lists more complete. We are always glad to receive good reviews of appropriate works within our scope, as well as news items, comments on pertinent subjects, and short original papers.

NEWS

PALAEOECOLOGY OR REEFS: The Palaeontological Association organized a one-day symposium at Edinburgh on 9 September 1971 as part of the joint meeting of British Geological Societies. Papers covered both modern and ancient reefs. In the former class, several of the papers were based on work either in the Seychelles or at Aldabra. Thus Dr E. Drew spoke on "Reef front phenomena of Aldabra: an ecological interpretation;" Dr J. Taylor on "Habitat complexity and faunal diversity on Recent reefs;" Mr. B.R. Rosen on "Ecological stratification in coralline environments;" and Dr. C.J.R. Braithwaite on "Ecology, palaeoecology and reef recognition." Two papers drew on recent work at Bermuda. Dr P. Garrett considered "Bermuda lagoon reefs and their palaeoecological significance," and was concerned with the ways that small coral colonies develop into micro-atolls and then into patch reefs or, as he termed them, mesa-reefs. He stressed the importance of biological erosion concurrent with growth, and showed that a large percentage of the volume of patch reefs was open cavity. Dr T.P. Scoffin also drew on West Atlantic experience in interpreting the "Conditions of growth of the Wenlock reefs of Shropshire." The fossil reefs covered a wide range: Palaeozoic (Dr C.T. Scrutton), Mesozoic (Dr F.M. Broadhurst and Dr I.M. Simpson on Derbyshire; Mr. J. Miller on west Yorkshire; Dr D.B. Smith on the Permian in Durham and in the Guadeloupe Mountains of Texas), and Coenozoic (Dr E.B. Wolfenden and Dr D.D. Bayliss on the Libyan Palaeocene). Dr G. Farrow also spoke on rudist reefs.

The often heated discussion revealed a sharp difference of view between the ecologists and the palaeoecologists. The latter were content with a catholic interpretation of the term reef; the former, impressed by the thinness of many modern reefs and the fact that coral communities are not necessarily reef structures nor are reef structures necessarily covered with coral communities, wanted a more precise definition which they were themselves, however, unable to succinctly provide. Brian Rosen summarized the position lucidly when he pointed out that modern reefs are growing in highly atypical immediately post-glacial conditions, and it is hence difficult to extend concepts of reef structure derived from the study of modern reefs to those in the past. Dr Braithwaite considered, however, that there were certain criteria of scale, zonation and structure (in the sense of frame-building) that must be satisfied before the term reef could legitimately be used. It was noticeable that some of the palaeoecologists used terms such as "reef flat," derived from contemporary reefs, without considering the extent to which these forms owed their characteristic features to the highly unusual conditions of the last several thousand years. The discussion ended rather inconclusively, with the palaeoecologists on the whole unconvinced that the issue of reef definition was a real one, and the ecologists unable to provide a convincing definition of what they considered to be a reef.

In summing up Sir Maurice Yonge drew attention to the need for further work on corals as animals. He noted recent work on the role of zooxanthellae in coral nutrition, on competition between corals, and on the testing of species in corals by immunological methods, and he stressed the need for long-term study of population fluctuations on reefs, possibly on islands set aside as laboratories by the Islands for Science Programme. One was left with the feeling that more palaeoecologists should follow the lead given by Newell twenty years ago and study modern reefs as well as ancient ones -- but that comment comes from a modern reef-man, not an ancient one; the latter might well reverse it.

D. R. S.

Apropos of some of the remarks reported from this symposium it may be well to remind readers that regardless of the supposedly atypical conditions under which modern reefs are growing, reports on the cores and cuttings from the various deep drillings on atolls and barrier reef islands, some going back to the early Eocene or even late Cretaceous, do not indicate any startling difference or new characteristics introduced in the structures produced during the last few thousand years. A survey of fossil reefs made some years ago by Ted Ballard indicated that the great preponderance of reef growth throughout geological time has taken place during periods of transgression (personal communication). On a geological scale, at least, that is what post-glacial time has been.

F.R.F.

NEW INDIAN OCEAN RADIOCARBON DATES: D. P. Agrawal, S.K. Gupta and S. Kusumgar ("Tata Institute radiocarbon date list VIII") report some new dates from reef areas in the Indian Ocean in *Radiocarbon* 13: 84-93, 1971. Samples collected by S.G. Patil from Minicoy are dated as follows: TF-1017, coral, depth 3 m, 1575 ± 85 BP; TF-1022, coral, depth 0.9 m, modern. Several samples from the Gujarat coast and the Rann of Cutch, mostly from coral samples, are dated between ca 4500 and 6500 BP. Other samples dated come from coastal plain and continental shelf environments, the latter including one sample, TF-969, in 96 m of water off Bombay, of coral dating at only 140 ± 90 BP. We look forward to the papers which will place these dates in their geological framework.

SCOTT REEF, SAHUL SHELF, AUSTRALIA: The northwestern Australian reefs are among the least known in the world, apart from a reconnaissance report by C. Teichert and R.W. Fairbridge (Some coral reefs of the Sahul Shelf, *Geog. Rev.* 38: 222-249, 1948). In June 1971 Australian newspapers carried reports of deep drilling on Scott Reef, $14^{\circ}05'S$, $121^{\circ}50'E$, immediately south of Seringapatam Atoll, carried out by a consortium including Woodside Oil NL, BOC of Australia, Mid-Eastern Oil NL, Shell Development (Australia), BP Development Australia, and California Asiatic Oil Co. Gas flow rates from Scott Reef No 1 well have been

reported as: 18 million cubic feet of wet gas a day from the interval 14,105-14,124 ft; 11 million cubic feet from 14,240-14,330 ft; and 9.8 million cubic feet from 14,370-14,390 ft. Exploitation of this gas field is being considered, and it is possible that a land-based production installation could be based on a small island on Scott Reef. The lagoon with a depth of 20 fathoms could be used as an anchorage. In view of the lack of knowledge about these reefs, it is to be hoped that these developments will provide an opportunity for thorough faunal and floristic studies of Scott Reef (including land areas) before development begins. These details of the Scott Reef well appeared in *The Australian* for 9 and 16 June 1971.

TONGA: The Oct. 7 issue of the *Tonga Chronicle* announces the initiation of oil drilling with great fanfare at Ma'ufanga, Tongatabu. It is with mixed feelings that we read this. We are, of course, sympathetic to the Tongans' desire for prosperity, and we are interested in what will be learned about the subterranean structure of Tongatabu. On the other hand, we have seen what oil strikes have done to other societies, including some regional branches of our own, and we would be most unhappy to see one of the few still truly viable Polynesian cultures destroyed by too sudden prosperity and "development." We hope that, at least, the agreement between the Tongan Government and the Tongan Oil Participants calls for full publication of the scientific results of the drilling, that cores will be taken, and that provision is being made for their scientific examination and study. We are happy to offer the pages of the ARB for publication of any scientific observations that result from this enterprise.

SEYCHELLES: The Government of the Seychelles has just published a "white paper" setting forth the current government policy on conservation matters in the Archipelago. This 10-page document is obtainable from the Seychelles Ministry of Agriculture, Natural Resources and Marketing, Victoria, Mahé, Seychelles, for 3 shillings.

The paper summarizes the present conservation legislation and explains the plans of the government to implement these regulations and to introduce additional provisions where necessary. The plans are largely based on a report by Mr. J. Procter, who spent some months studying the situation in detail. The government has, in most respects, accepted the recommendations of the Procter report.

We need not go into any detail on what is planned, as anyone interested will certainly send for the document itself. It is a satisfaction to be able to congratulate the Seychelles Government on their plans for the protection of what is left of the magnificent land fauna and flora of the islands, and especially to commend their being ahead of most of the rest of the world in establishing marine parks. The intent to prohibit spear-fishing is an encouraging development that could well be emulated elsewhere.

The recent opening of the new international jet airport on Mahé makes this firm set of policies on conservation especially timely. In order to support a lasting tourist trade, the Seychelles will have to have, over the long pull, something to offer beside novelty and remoteness. The natural features, both marine and terrestrial, provide this. To properly utilize them, an active program to study and make known the island natural history is essential. There is a rumor that Mr. Procter will return to the Seychelles as conservation officer. If true, this will give him an opportunity to help implement this program for which he is largely responsible.

SOOTY TERN STUDIES IN THE SEYCHELLES: For some time concern has been expressed about the exploitation of Sooty Tern eggs in the Seychelles, the scale of which has led to a reduction in the sizes of some colonies (see, for example, M.W. Ridley and R. Percy: *The exploitation of sea birds in Seychelles*, Colonial Res. Stud. 25: 1958). Dr C.J. Feare, of the University of Aberdeen, has now been given a grant by the Natural Environment Research Council for a three-year study of the problem, beginning in 1972. The aims of the study are to collect basic data on the breeding output of the birds, and to lay the foundations for longer-

term work which will permit the construction of mathematical models of the population dynamics of the species in the Indian Ocean. From the results a rational plan of exploitation will be formulated.

During the first season the general breeding biology will be studied in order to discover the causes and extent of natural losses within a colony, and how these vary in different parts of the colony and at different times in the season. The second year will be devoted to observing the effects of experimental removal of eggs on the overall output of the colony.

The results of these investigations will provide a basis for the work of the third season, in which Sooty Tern colonies in the Seychelles will be counted, and recommendations made for the modification (if necessary) of existing regimes of commercial exploitation, in order that the futures of both the tern colonies and the egg industry will be assured.

DUCIE ATOLL: As a part of his long-term investigation of the marine mollusk fauna of Polynesia, Dr Harold Rehder, on Jan. 13-15, 1971, visited little known Ducie Atoll, between Pitcairn and Easter Islands, perhaps the most remote and isolated of all coral atolls. Notable was the fact that the forest on Ducie is composed of only one species of tree, *Tournefortia argentea*. Rehder gave a lecture on the impoverished biota of this atoll at the National Museum of Natural History on Feb. 10, 1972. We hope to be able to offer our readers a description of Ducie by Dr Rehder in the near future.

FANNING ISLAND EXPEDITION: Under the auspices of the Hawaii Institute of Geophysics, a group of 26 scientists and students from the University of Hawaii and the B.P. Bishop Museum spent over three weeks on Fanning Island doing scientific investigations of great diversity. This atoll was the site of one of your editors' (F.R.F.) introduction to coral atolls, some 38 years ago, so this expedition is of extra special interest to him. The leader of the party was the eminent geologist, Prof. Keith E. Chave. Support was provided by the National Science Foundation.

That the visit was a most productive one is shown by the massive report, HIG-70-23, published in November 1970, and a fine series of papers in the April 1971 issue of Pacific Science (25: 188-289). The papers in the report and in the Pacific Science number dealing with land aspects have been listed and annotated in the Supplement to Island Bibliography, recently published. The marine papers, by far the majority, are listed in the "Briefly noted items" section at the end of the present Island News and Comment. The University and Keith Chave are to be congratulated on this achievement.

MEETINGS: *The Regional Symposium on Conservation of Nature - - Reefs and Lagoons*, organized and hosted by the South Pacific Commission in collaboration with the International Union for Conservation of Nature and Natural Resources, took place in Noumea, Aug. 5-14, 1971.

During the first days, the territorial representatives described and discussed the problems of their territories, of which unfortunately only a limited number were represented. It became quickly apparent, then and later in the more general Symposium starting on Aug. 9, that lagoon pollution, reef destruction and other conservation problems are not uncommon in Pacific island territories and are in fact rapidly becoming alarming in many of them. Twenty-one resolutions on the protection of reefs and lagoons and on more general topics were adopted and addressed to the SPC and governments and administrations concerned. They are published as a supplement to IUCN Bulletin 2(21): Oct.-Dec. 1971. A large number of mimeographed background papers, and draft proceedings, were available at Noumea.

Planned utilization of the lowland tropical forests. A symposium sponsored by the Indonesian Institute of Science (LIPI), the Regional Center for Tropical Biology (BIOTROP) and Unesco was organized by the Standing Committee on Botany of the Pacific Science Association at

Tjipajung Indonesia, Aug. 12-14, 1971. It included one session on Pacific Islands forest conditions. A report on this meeting, by Prof. D. Mueller-Dombois, appears in *Nature and Resources*, a newsletter published by Unesco, 7(14): 18-22, Dec. 1971.

Twelfth Pacific Science Congress, Canberra, Aug. 18-Sept. 3, 1971. The Noumea and Tjipajung symposia were pre-congress meetings and many of the participants went on to Canberra where the Australian National Academy organized the congress at the Australian National University. A report on the Congress is available in the *Pacific Science Association Information Bulletin* 23(3-5): Oct. 1971. This includes portraits of the recipients of honors and awards announced at the opening session: Dr Sarwono Prawirohardjo and Sir Maurice Yonge were made Honorary Fellows of the Association, Dr Carl L. Hubbs received the Shinkishi Hatai Medal and Dr F. Raymond Fosberg the Herbert E. Gregory Medal for distinguished service to science in the Pacific. The 13th Pacific Science Congress will be held in Vancouver in 1975, at the invitation of the National Research Council of Canada.

M.-H.S.

The International Symposium on Coral Reefs (see ARB 148: 8) sponsored by the Great Barrier Reef Committee with the Committee for International Symposia on Corals and Coral Reefs is to be held at Heron Island and other locations on the Great Barrier Reef, tentative dates are now 29th May-10th June 1973. Address inquiries to Dr. G.R. Orme, Dept. of Geology and Mineralogy, University of Queensland, St. Lucia, Q4067, Australia.

PLANTS OF OCEANIA: Botanists interested in Pacific island floras will be glad to learn that the vast accumulation of unmounted island collections in the Paris herbarium, long in storage, are being sorted to family and made accessible to visiting botanists. Mr. N. Hallé, Sous-Directeur, Laboratoire de Phanérogamie, has undertaken the immense task of sorting through this accumulation of 150 years. He is willing to make available to serious workers material in any family, providing the botanists intending to visit the Paris herbarium will inform the Directeur of the Laboratoire de Phanérogamie, 17 rue Buffon, Paris V^e, France, of their planned visit and their needs sufficiently in advance.

ISLAND SCIENCE NEWSLETTERS: A number of informal serial publications have been established that deal wholly or in part with scientific affairs on islands or with matters of interest to island scientists. Several of these will be listed, with their sponsoring organizations and addresses and editors if known. We will not usually repeat news items that appear in these newsletters, unless they seem of unusual importance to our readers.

The Elepaio. Hawaiian Audubon Society, eds. Miss Charlotte Hoskins and Miss Unoyo Kojima, P.O. Box 5032, Honolulu, Hawaii 96814, U.S.A.

Newsletter of The Hawaiian Botanical Society, c/o Dept. of Botany, University of Hawaii, Honolulu, 96822, ed. Russell K. LeBarron.

Aldabra Newsletter. The Royal Society, 6 Carlton House Terrace, London, S.W. 1, England. Requests to be placed on the mailing list should be sent to Dr. D.R. Stoddart, Dept. of Geography, Downing Place, Cambridge CB2 3EN, England. He also keeps a mailing list of those persons interested in exchanging publications, especially in the fields of terrestrial and marine ecology of tropical oceanic islands and coral reefs, for reprints of papers on Aldabra forming a series entitled Contributions from the Royal Society Aldabra Research Station.

Association for Social Anthropology in Oceania Newsletter, ed. Bob Kiste, Center for South Pacific Studies, University of California, Santa Cruz, Calif. 95060, U.S.A.

The Palaeontological Association Circular, ed. Dr. J.A.E.B. Hubbard. Geology Dept., Kings College (London University), Strand, London, W.C. 2, England.

Environmental Sciences Quarterly Newsletter, Office of Environmental Sciences, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

CITRE Newsletter, ed. Stephen Smith, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

An Environmental Newsletter, Caribbean Conservation Association, c/o Caribbean Research Institute, College of the Virgin Islands, St. Thomas, U.S. Virgin Is. 00801.

Pacific Island Program Bulletin, Dept. of Anthropology, University of California, Los Angeles, Calif.. 90024, U.S.A. (This bulletin ceased publication with no. 15, Oct. 20, 1971).

News and items of current interest are also reported in the *Pacific Science Association Information Bulletin*, Miss Brenda Bishop, ed., Bishop Museum, P.O. Box 6037, Honolulu, Hawaii 96818, and *Cahiers du Pacifique* usually include sections on News, Meetings, and Congresses, and bibliographies. No. 15, Sept. 1971, received in Washington in early 1972, includes such a section of "Nouvelles du Pacifique" of 74 pages, by J. Plessis. Address for the Cahiers: Fondation Singer-Polignac, 43 Ave. Georges-Mandel, Paris 16e.

ISLAND BIOLOGICAL STATIONS:

West Indies Laboratory: In July 1971 classes opened at the new West Indies Laboratory of Fairleigh Dickinson University at Teague Bay on St. Croix Island, U.S. Virgin Islands. Starting with a magnificent physical plant, though modest in size, including laboratory and library buildings, dining hall, living quarters for students, staff, and visiting research workers and faculty, a pier and boat house, shop, sewage treatment and recycling plant, and warehouse, this tropical station has immediately taken its place as one of the finest combination teaching and research facilities in the Caribbean. The director is Prof. H. Gray Multer, the resident scientist is Dr John Ogden, and the manager is Mr. Lowell Bingham. Courses in geology, ecology, zoology, botany and marine biology are offered. During periods when no regular classes are scheduled the laboratory is available for use by classes from other universities by arrangement with the director. Arrangements also may be made for use of the facilities by visiting investigators. A brochure is available on request. The address of the station is West Indies Laboratory, P.O. Annex Box 1010, Christiansted, St. Croix, U.S. Virgin Is. 00820.

University of Guam Marine Laboratory: The new marine science facility of the University of Guam opened on January 15, 1971, in a well-equipped building, beautifully situated on Pago Bay, east coast of Guam, just below the University campus. Flowing sea-water, boats, diving gear and other equipment for marine biological studies are available. Prof. Lucius G. Eldredge is director and will supply information on request. The address is Marine Laboratory, University of Guam, P.O. Box EK, Agaña, Guam, 96910, U.S.A.

The University Marine Biological Station, Millport, Isle of Cumbrae, U.K.: This station, formerly known as the Marine Station at Millport, is now functioning under new auspices, controlled by the Universities of London and Glasgow. Its objectives are teaching and research in marine biology. The director is Prof. Norman Millett, formerly Professor of Zoology at Bedford College, University of London. Besides courses offered by the station, accommodation will be provided for outside classes accompanied by their own teachers.

Royal Society Research Station, Aldabra: The Royal Society has announced the appointment of Dr David Wood as the new director of the station. The lease of the island, formerly held by H.Savy and Co., Ltd., of the Seychelles, has been assigned to the Royal Society. The purchase of this lease was in large part made possible by a donation from Mr. Christopher Cadbury. Detailed news on Aldabra research activities will be found in issues of the Aldabra Newsletter and in press releases from the Royal Society, 6 Carlton House Terrace, London, S.W. 1, U.K.

Antenne de Tahiti: The Muséum National d'Histoire Naturelle of Paris has recently established an outpost or "antenna" in French Polynesia. There will be a small station on Moorea, and research plans for 1972 include studies on Rangiroa, Bora-Bora, and Taiaro Atoll. The director is the very active malacologist, Dr Bernard Salvat of the Muséum (55 Rue de Buffon, Paris 5), and the mailing address of the station is B.P. 562, Papeete, Tahiti, French Polynesia.

RECENT DEATHS:

Edwin C. Allison: Ned Allison died suddenly on Jan. 1, 1971. He was struck down while guiding students on a fieldtrip, near Caborca, Sonora, Mexico. His work was mostly in paleontology, but he also collected and studied living forms, especially mollusks. He took part in the 1958 Scripps Institution expedition to Clipperton Island and published several papers on the mollusks with L.G. Hertlein. He was a gentle and patient colleague in the field, and generous in exchanging information or photographs later. Of some comfort to his friends and colleagues, as well as his family, is the fact that San Diego State College has announced that there will be an Edwin C. Allison Center for the Study of Pacific faunas in the Department of Paleontology where he taught.

Richard J. Russell: Dean Russell died on September 17, 1971, at Baton Rouge, Louisiana at the age of 75. Coastal geology and geomorphology thus lost one of its most active and distinguished leaders. Not only through his own research did he advance his science, but even more through the students and younger colleagues that he helped and encouraged. His Coastal Studies Institute at Louisiana State University is one of the most important centers for the study of coastal geomorphology. We sincerely hope that, even without Russell's leadership, it will continue to be outstanding and productive in this fascinating field of research.

SHORT PAPERS

NOTES ON THE HERPETOFAUNA OF KUME-JIMA AND O-JIMA, RYU KYU ISLANDS

by Clifford Ray Johnson
Department of Zoology, The University of New England
Armidale, N.S.W. Australia

Kume-jima, the westernmost island of the Okinawa Group, covers 26 sq. miles and lies 55 miles W of Okinawa in the East China Sea. Like most of the Ryu Kyu Islands, it is subtropical with a mean annual temperature of 72°F, average humidity of 80%, and a mean annual rainfall from 51 to 91 inches. O-jima lies 1 mile S of Kume-jima and has an area of about 1 sq. mile.

The islands appear to be of volcanic origin with a shoreline composed of disintegrated corals and conglomerates. Kume-jima is forested, like Okinawa, in montane regions and cultivated along the coastal areas. O-jima is entirely cultivated. Both islands were by-passed by World War II.

The herpetofauna of Kume-jima, although one of the larger islands of the Okinawa Group, is very poorly known. During March 1965, I visited Kume-jima and O-jima and made small collections of reptiles and amphibians over a period of five days. The only previous mentions of Kume-jima in the literature are by Koba (1959) and Okada (1966).

Rana limnocharis Boie (in Weigmann)

Four specimens were collected near Gima in a cultivated field. They appeared similar to specimens from Okinawa where this is the most abundant species of ranid (Johnson, 1969).

Rana namiyei Stejneger

A single specimen, 85 mm snout-vent length, was captured near a rice field close to Gima. This species on Okinawa is usually restricted to montane areas, but appears to be more eurytopic on Kume-jima.

Eumeces marginatus (Hallowell)

One specimen was collected at the edge of a cultivated field in dense brush near Gima. Another was seen in a similar habitat near O-village, O-jima. None were seen along the beaches, although they were often found in such habitats on Okinawa.

Ateuchosaurus p. pellopleurus (Hallowell)

One specimen, 42 mm snout-vent length, was collected near Gushikawa in a grass field.

Takydromus smaragdinus Boulenger

Three specimens were collected in thick grass adjacent to a cultivated field near Gima.

Trimeresurus okinavensis Boulenger

One specimen was seen in a grass field on Mt. Uegsuka. According to the natives these snakes are common throughout the island. Other species of *Trimeresurus* may also occur on the island.

The following is the most complete check-list to date of the herpetofauna of Kume-jima based upon my collection and those of Koba (1959).

Order Salientia

- Microhyla ornata* (Duméril and Bibron)
- Rhacophorus viridis* (Hallowell)
- Rana limnocharis* Boie (in Weigmann)
- Rana namiyei* Stejneger

Order Sauria

- Eumeces marginatus* (Hallowell)
- Ateuchosaurus p. pellopleurus* (Hallowell)
- Takydromus smaragdinus* Boulenger

Order Squamata

- Trimeresurus okinavensis* Boulenger

ACKNOWLEDGEMENTS

I wish to thank Cdr. William F. Russell, CEC, USN, for his cooperation during field operations and Rev. and Mrs. Kanard for extending their hospitality during my stay on Kume-jima. Transportation was arranged by the U.S. Navy. Dr Harold F. Heatwole, The University of New England, reviewed the manuscript.

LITERATURE CITED

- Johnson, C.R. 1969. Herpetofauna of Okinawa, Ryu Kyu Islands. *Herpetologica* 25(3): 206-210.
- Koba, K. 1959. Herpetofauna of the Amami Group of the Loo Choo Islands (III). *Mem. Fac. Educ. Kumamoto Univ.* 7: 187-202 (in Japanese).
- Okada, Y. 1966. Fauna Japonica: Anura (Amphibia). *Biogeogr. Soc. Japan, Tokyo*, 1-234, 24 plates.

LAYSAN ALBATROSS AS CARRIER OF FLOATING DEBRIS TO LAND

by Miklos D.F. Udvardy
Sacramento State College, Calif.

Upon reading Kenyon and Kridler's interesting note (Laysan albatrosses swallow indigestible matter, *The Auk* 86: 339-343, 1969), I found that my own observations on Laysan might modify the impression these authors gave about the carrying ability of albatrosses and the hydrography of that island.

During two expeditions to Laysan Island (see notes in *Elepaio* 20: 16, 1959; 22: 43, 1961, and in *ARB* 103: 1964) my own experience with juvenile and adult albatross skeletons was by and large similar to that of Kenyon and Kridler: the carcasses and skeletons we found were also lined with pumice, armoured fish, kukui nuts and other indigestibles though plastic artifacts were not observed by us.

Kenyon and Kridler note that the "Lagoon" of Laysan Island is not connected by any channel with the sea (i.e. it is, in reality, a lake) and therefore they conclude that the plastic and pumice they found deposited at high water line of the lagoon must have originated from contents of albatross carcasses. But this conjecture needs to be modified: some, but not *all*, the former floatsam on the perimeter of this lagoon originates with the albatrosses. An undeterminable portion of the debris--and certainly all large-sized pieces, too big for albatrosses to swallow--should rather be assumed to have been brought in by the huge waves of winter storms which break through the flat coral sand area that girdles the lagoon on the south and which is only at a few places reinforced by low ridges or patches of phosphate rock. This area is devoid of a protective beach crest and here and northward up to the edge of the lagoon we found in June 1959 dozens of Japanese fishnet floats: heavy glass balls of 80 and 90 mm, or even more, in diameter, certainly unfit for albatross consumption. It is safest to assume that these glass floats were brought in by wave action. Then, other floatsam is likely to enter the lagoon the same way and the albatrosses are not the only carriers to blame for all deposited foreign material.

MOROTIRI (BASS ROCKS) AUSTRAL ISLANDS

by F.R. Fosberg
Smithsonian Institution

Morotiri or Bass Rocks is a small cluster of 4 rugged volcanic rocks and a number of stacks that form the southeast extremity of the Austral Island Group, in French Polynesia. They are located about 46 miles east by south of Rapa, at about 28°S, 143°30'W. As nothing of a general nature seems to have been published on their natural history, it may be worthwhile to publish notes made on a short visit on July 22, 1934, when Harold St. John, Elwood C. Zimmerman and I landed on the largest of the rocks and collected what could be found and

reached in a couple of hours of scrambling and climbing over guano-covered ledges and cliffs.

The highest of the rocks is about 100 m high and not much more than that wide, several times as long. The rocks were practically without a real covering of vegetation. A sparse growth made up of *Cyperus*, *Bidens*, *Digitaria* and *Portulaca* was present on the non-perpendicular slopes and ledges, almost luxuriant in favorable spots. In the crevices in the rocks *Asplenium*, *Nephrolepis*, and *Cheilanthes* formed tufts. *Solanum nigrum* was present here and there. *Lycium* was seen on the lowest slopes, and a prostrate *Euphorbia* formed mats on one slope on one end of the island. A sterile rosette of *Sonchus* was seen.

Some of the rocks were sparsely covered with lichens. A sterile moss was occasional around seeps. These seeps were evidently highly charged with lime or some other substance that crystallized out around the cracks.

Under the plants and stones was a remarkably large fauna of insects, spiders, centipedes, and isopods. Of the last, 3 species occurred under stones and a species of *Ligia* ran around over rocks, collecting in numbers under overhanging rocks. At least 1 species of centipede, 4 or 5 of spiders, 1 or 2 of ticks, 2 of mites, 1 of *Lepisma*, 1 of *Machilis*, 2 of Collembola, 1 cricket, 1 or 2 of ants, 1 lygeid, 4 species of *Rhynchogonus*, and 1 other weevil all lived under stones and plants. Two or 3 kinds of flies and 2 of moths were seen flying. A louse fly (*Olfersia* sp.?) was abundant on shearwaters.

Birds were more than abundant, but nearly all belonged to a species of gray tern and 2 or 3 of shearwater. A couple of white-tailed tropic birds were seen. The shearwaters were nesting and eggs and young were abundant on small ledges and between tufts of sedges. Burrowing would be difficult here.

The rock is composed of more or less bedded basalt, forming a high core in the center, and the two ends are capped with tilted beds of what is probably tuff (described as "apparently sedimentary rock" in my notes at the time).

No coral was seen. Encrusting calcareous algae colored the lower rocks. Non-calcareous algae were reasonably abundant but badly beaten to pieces by wave action. The waves, even at the "quiet" period of our visit, were several meters high, making landing hazardous, to say the least. Acorn barnacles and chitons were seen on the lower rocks.

Fish of many kinds were abundant in the area and many were caught while the ship cruised around the area near the rock while we worked.

SOME LAND BIRD MIGRANTS IN THE WESTERN INDIAN OCEAN

by C.W. Benson

Mr. H.H. Beamish has shown me a colour slide of a bird photographed by him in November 1970 on African Banks, Amirante Islands, at ca. 5°S, 53°E (for an account of the geography and ecology see Stoddart & Poore, ARB 136: 187-191, 1970). Undoubtedly the bird is a *Phylloscopus* species, and on geographical grounds by far the most likely is the Willow Warbler, *P. trochilus*, from which the bird on the slide was indistinguishable. On the African mainland this species is abundant during the palaeartic winter, even reaching as far south as South Africa (Mackworth-Praed & Grant, African handbook of birds, Ser. I, Vol. 2: 1955). According to the same authors, the Chiff-Chaff, *P. collybita*, not certainly distinguishable on the evidence of this slide from *P. trochilus*, migrates almost as far south as the equator, but its occurrence on African Banks seems extremely unlikely. As far as I am aware, this is the first record of a palaeartic breeding sylviid from any island in the western Indian Ocean south of the equator. Indeed

Ripley and Bond (Smiths. Misc. Coll'ns. 151(7): 1966) do not even give any such record from Socotra, although they quote single old records each of *P. collybita* and the Whitethroat, *Sylvia communis*, from Abd-el-Kuri, between Socotra and Cape Guardafui.

Among records of birds received by the Royal Society from J.A. Stevenson on Aldabra, copies of which were transmitted to me by D. Griffin, the following from West Island should be mentioned:

Eurystomus glaucurus, Broad-billed Roller: One seen at 15:00 hrs. on 20 October 1970. Benson and Penny (Phil. Trans. Roy. Soc. B260: 517, 1971) give but few records from Aldabra and neighbouring islands.

Oenanthe oenanthe, European Wheatear: One seen at 15:00 hrs. on Wed. 27 January 1971, with a note that there had been a cyclone the previous week. What was presumably the same individual was seen again on 1 and 5 February 1971. Benson and Penny (*op. cit.*: 519) suggest that this species may winter regularly on Aldabra in very small numbers.

HURRICANE LAURA, WITNESSED IN BRITISH HONDURAS

by Arnfried Antonius
Smithsonian Institution

Hurricane Laura was first reported on Sunday, November 14, 1971, in the morning. It was then a mere tropical storm near Swan Island, but in the afternoon it reached hurricane force and was baptized Laura. During the following days Laura first travelled N in the direction of Cuba, then turned W and finally S along the coast of the Yucatan Peninsula. It entered British Honduras territory in the early morning of November 20. By about mid-afternoon the hurricane had passed Belize, with wind speeds about 70 knots and thus not doing any harm. In Stann Creek though, things were slightly different. Belize and Stann Creek lay both on the western rim of the hurricane, but as it moved more and more southwesterly, the eye came closer to Stann Creek. Winds blew during the day first from the W, then NW, N, NE, and in the afternoon from the east. The eye was closest then. The winds came from the open sea and reached at least 80 knots. About half the harvest was lost in the extensive Citrus plantations east of Stann Creek, and wave action removed the longest wooden pier of the area.

On Glover's Reef, winds first came roughly from the W with speeds up to 70 knots. Wave action piled up large heaps of *Thalassia* and algae along the lagoon side of the cays without doing damage. The eye passed around noon, creating a two-hour lull. The most violent stroke came after this, with sudden wind forces of 80-100 knots from the NE; this lasted only a few minutes and calmed down to 70-80 knots shortly afterwards, but during this brief time some damage was done to the facilities of a diving resort on Long Cay. The winds sank a 35-foot vessel, blew down one of eight existing cottages, and removed half the tin roof of another hut. Very few coconut trees fell. Underwater, on the eastern and northeast fore-reef slope, broken trunks of *Acropora palmata* up to 20 cm in diameter could be observed here and there, as well as large colonies of *Acropora palmata* and *Diploria strigosa* turned upside down. However, only 2m to the right or left of them, it was possible to find much younger colonies, very fragile and yet completely unharmed. Therefore, the character of the turbulence must have varied considerably within a space of a few meters.

In the evening, Hurricane Laura was in the Monkey River area and it dissolved and disappeared during the night south of Punta Gorda. Hurricane Laura was at least 100 miles in diameter, slow moving and of moderate force.

In its wake, Laura dragged along the windy, cool and rainy weather of a proper "Norther." The heavy rainfall during the night and during November 21 caused extended inundation in the flat coastal areas of British Honduras and made some of the most important roads impassable. A zone several hundred meters wide of brown muddy water along the British Honduras coast made the freshwater influx clearly visible, the major rivers causing extensive protrusions of this discoloration to almost half way across the barrier reef lagoon.

In conclusion, it can be stated that Hurricane Laura was an unusually late Hurricane, followed by an unusually early "Norther." Fortunately, the overall effects of both on British Honduras can be considered negligible.

PUBLICATIONS

REVIEWS:

Westoll, T.S. and Stoddart, D.R. (organizers), 1971. A discussion of the results of the Royal Society Expedition to Aldabra 1967-68, Philosophical Trans. Royal Soc. London, ser. B, 260 (836): 654 p. £19.00, \$50.00. It is a curious fact that two of the most intensively studied atolls in the world were investigated for entirely different reasons. Bikini, in the Pacific, was investigated twenty-five years ago to evaluate the destructive power of atomic bombs. Now, Aldabra, in the Indian Ocean, is being given similar treatment in a laudable attempt to save it from the effects of encroaching civilization.

Aldabra, an atoll that rises from the deep sea, is the last undisturbed elevated reef island in the Indian Ocean. Its continued existence in this category was threatened in 1965 when the British Ministry of Defence announced a plan to construct a Royal Air Force Staging-Post there for planes flying to the Far East. In addition to a landing strip, the plan called for the construction of a harbor for tankers, a road, and a radio transmitting station. Realizing that such construction would probably have a devastating impact on the island and its unique fauna, the Royal Society, on behalf of scientific and conservation organizations, dispatched in 1967 a scientific expedition to study the island. In that same year the military plans were abandoned for financial reasons but the Society wisely continued its studies in the hope that the establishment of a scientific research station on the island would give protection to the area in the foreseeable future. The present volume presents Aldabra's case in a most impressive manner.

In September 1966 D.R. Stoddart and C.A. Wright had accompanied the survey party that went out to reconnoiter the island as a potential staging-post and radio station site. Stoddart was named a member of the Aldabra Research Committee set up by the Royal Society to work with personnel from the Smithsonian Institution, the U.S. National Academy of Sciences and the University of the Witwatersrand in a lengthy research program. Stoddart became the overall expedition leader and is the author, or co-author, of a number of the papers in the present volume. To date, more than forty persons have participated in the expeditions to Aldabra.

The biota of Aldabra is an interesting one that is intermediate between that found on sea level atolls and that of the high islands. It has many remarkable features. It supports, for example, an estimated total of 100,000 Giant Land Tortoises; it is the land base for several kinds of marine turtles; the largest colony of frigate birds in the Indian Ocean (30,000) breeds there. The island is the home of several distinct species and subspecies of land birds. One of these, a new warbler, was discovered during the present investigation; another is the rail, *Dryolimnas*. This is the last of the flightless birds of the western Indian Ocean but at least 1000 still survive on Aldabra.

Aldabra is a very small island. The overall area is only 365 square kilometers, the land area about 40 percent of the total. Bikini, with an overall area of more than 700 square kilometers, is nearly twice the size of Aldabra, but Bikini's land area is only about 10 percent of its total.

Aldabra was probably discovered during the earliest years of the 16th Century but it remained uninhabited by man for about 400 years. Scientific studies of several sorts have been made at Aldabra over a period of nearly 100 years and many of the early visitors made large collections of plants, insects and birds. An ecological survey of Aldabra and nearby islands was made by Fryer in 1903 and Aldabra became one of the better known reef islands of the Indian Ocean. Not much additional work was done in the sixty years that followed - - not until the activity that grew out of the recent crisis.

The present quarto volume with more than 650 pages and many excellent illustrations is an elaborate and satisfying treatment of many aspects of Aldabra and its life. It consists of two dozen reports. These give many data that support a series of earlier papers that presented the bare essentials of what came to be known as "The Aldabra Affair."

A summary of earlier scientific studies at Aldabra and neighboring islands is followed by a series of reports dealing with the physical environment - - the geomorphology, climate, tides, and shallow water environments. These studies set the stage for reports that deal with the existing flora (ground covers, mangroves, terrestrial and freshwater algae) and fauna (invertebrate and vertebrate). Among the invertebrates, special treatment is given to the ostracodes, the freshwater snails, insects and decapod crustaceans. Among the vertebrates, the tortoises, sea turtles, and birds (land birds, migrant waders and sea birds) are fully treated and a report on bats is included. Both reptiles and birds were examined for blood parasites. Some of the reports are short and admittedly preliminary, but all are well organized and offer a sound foundation for future work. In addition to the subjects already mentioned, there is a special report on the origin and distribution of the flora of Aldabra and an analytical study of the evolution of terrestrial faunas in the western Indian Ocean.

It is surprising and certainly most gratifying that Aldabra has remained almost completely undisturbed during a lengthy and not entirely uneventful history. Commercial exploitation has been only sporadic. Unlike its three neighboring islands, Assumption, Cosmoledo and Astove, Aldabra has never been the site of serious mining operations for guano. The fact that rainfall on Aldabra is small and erratic and that areas of sandy soil are very limited has forestalled development of coconut growing. The fisheries potential is not great in the lagoon or in the waters outside. The Giant Tortoises make a profitable export but this traffic is controlled.

Aldabra is the largest of a group of four islands. It has a maximum height of 8.8 meters but still retains its atoll configuration - - a rim encloses a shallow lagoon with three entrances, two of which are deep channels. Large parts of the rim consist of jagged cavernous limestone (champignon) that is covered by dense scrub. Small areas (14 percent of the land area) at the eastern end are smoother and flatter (platin); they support a more open vegetation and furnish a home for the tortoises, frigate birds, and other species.

Solution surfaces and residuals are described in fair detail. Some are satisfactorily explained but others remain problematical. There is wide lateral facies variation in the elevated limestones and it is not possible at present to make island-wide stratigraphic correlations. Thus, the chronological framework of the limestones remains uncertain. Some Carbon-14 determinations have been made on *Tridacna* and *Chama* shells in the limestone; more are awaited.

The report on geomorphology is a joint effort involving four investigators. It discusses the topography and morphology of Aldabra itself, but these discussions are preceded by a wide-ranging summary of the regional setting that prepares the reader for a sketch of the probable evolution of the island. This is an interesting story but the authors recognize that it is by no means a final account. D.R. Stoddart, the senior author of the report on geomorphology, has informed this reviewer (written communication March 27, 1971) that subsequent work points to a much more complex picture. Studies of the limestone outcrops have revealed half a dozen transgressions and regressions and a large land fauna. Uranium dates at 125,000 years have also been obtained; these markedly older than the equivalent C¹⁴ dates.

The report on geomorphology deals only with the surficial features of Aldabra. The investigators hope, however, that, following additional geophysical work (magnetic, gravity and seismic) they can carry out a drilling program that will determine the nature and age of the atoll's foundation and reveal the major steps in its geologic history. The geophysical surveys will not injure the existing environment but the drilling would present a hazard and probably should be done on nearby Assumption Island. Deep drilling could establish a standard stratigraphic section for the western Indian Ocean comparable to that set up for the western Pacific by drilling in the Marshall Islands.

The work done to date has resulted in a fairly complete inventory of the fauna and flora existing on Aldabra. This includes a determination of the importance of exotic elements present. The time has now arrived to draw up a program for a Research Station that will preserve the rich values now in existence while studying the structure and functioning of the ecosystem. Future investigations will include dredging in the waters surrounding the atoll but this will in no way injure the existing environment.

The threat of exploitation has diminished because of economic reasons but it could be reactivated at a later date. Meanwhile, the excellent preliminary investigations are continuing and it is hoped that they will furnish any additional information that may be needed by the conservationists in their effort to save undisturbed Aldabra as a nature reserve and scientific research station.

Harry S. Ladd

Basilewsky, P., ed. 1970. La faune terrestre de l'île de Sainte-Hélène. Ann. Mus. Roy. Afr. Centr., Zool., 181: 1-227.

This informative volume is the first in an anticipated series stemming from two expeditions (1965-66) dispatched to St. Helena by the Musée Royal de l'Afrique Centrale of Tervuren, Belgium, to intensively collect the land and fresh water fauna of this ecologically devastated tropical south Atlantic island. Especially arresting is a series of excellently reproduced photo plates of a barren, weedy landscape, and tiny vestiges of native forest. Four introductory chapters, with maps, afford useful background on the present status of the island and its biota: Geography and climatology by N. Leleup; "Geological history of St. Helena in relation to its floral and faunal colonization" by Ian Baker; Vegetation by J. Decelle; a history of faunal exploration and study by P. Basilewsky and P.L.G. Benoit; and an account of the Museum's expeditions to the island with notes on collecting stations by Basilewsky and Decelle.

Animal groups systematically treated are: Vertebrates, largely sea birds, by Basilewsky; and eight orders of insects by specialists of several nationalities. Many new records and several new insect species attest the heretofore scant knowledge of a fauna already much depleted. The insect groups treated are Collembola, Diplura, Thysanura, Odonata, Blattaria, Isoptera, Orthoptera, and Dermaptera.

Bryce Decker

Yoshino, M.M., ed. 1971. *Water balance of Monsoon Asia - - a climatological approach*. Honolulu, University of Hawaii Press, 1-308. \$16.00. This handsomely produced volume comprises fifteen contributions, by as many Japanese authors, on the water balance and related atmospheric phenomena of Monsoon Asia and adjacent regions including the islands of Indonesia, northern Indian Ocean and the west and southwest Pacific.

Yoshino's introductory review of water balance problems and historical background is followed by four sections that take up sources and transfer of water vapor from season to season; distribution of precipitation, cloudiness and precipitable water during the summer monsoon; secular variation of precipitation and climatic change; and finally applications of several climatic classifications. There are many excellent maps and diagrams, the English is unstilted, and the bibliographies will be of interest for the access they afford to Chinese and Japanese literature on climate and weather.

Bryce Decker

Veevers-Carter, W. D. 1970. *Island Home*. 1-345, Random House, New York. Most of us know coral atolls from expeditions and short visits only. We hurry frantically to collect what we can and write what notes we can in the short time we have. We miss some of the essence of life in these microcosms. Our friend Wendy Veevers-Carter lived on one tiny 65 acre coral island, Remire, of the Amirante group in the Western Indian Ocean, for three years. One might expect that she had infinite leisure to soak up the essence of island life - - but the book gives quite the opposite impression. She was so continuously busy that one wonders when she had time to write the book. Essentially this is an account of human relations, of an effort to understand and deal with the entirely different pattern of behavior and set of mores and ethics of the Seychellois laborers. To the reader's continual great surprise the author pulled it off astonishingly well. And in telling the story she also succeeds in giving an idea, at least, of the coral island environment. The book is fascinating reading and recommended to anyone who has ever had the yen to run away and live on a tropical island. F.R.F.

Wodzicki, K. and Laird, M. 1970. *Birds and bird love in the Tokelau Islands*. *Notornis* 17: 247-276. This small group of atolls is well on its way to becoming one of the better-known of atoll archipelagoes, largely due to the investigations and publications of the authors of this paper and their colleagues in the rat and mosquito control projects carried out between 1958 and 1970. The present paper lists the bird species observed and collected and provides one to several paragraphs of observations of various sorts on each, largely descriptive and ecological, with native names and data on use of the birds as food. Several native folk tales about birds are placed on record. Occurrence, behavior, zoogeography and conservation problems are discussed. A bibliography of 44 items (not all on Tokelau birds) is provided, as well as maps of the atolls with place names. F.R.F.

Bloom, A. L. 1970. *Paludal stratigraphy of Truk, Ponape and Kusaie, eastern Caroline Islands*, *G.S.A. Bull.* 81: 1895-1904. The author interprets the swampy coastal plains, with their 2-3m of peat, as resulting from shore line progradation during a period of rising sea-level, slowing down about 4100 years ago. These flat benches have been regarded by many workers as evidence of a recent 1-2m emergence, which has been considered to fit nicely with 2m elevated reefs and notches in various parts of the world. The facts reported in Bloom's paper add to a growing body of evidence contrary to this presumed eustatic fall in sea level. To reconcile these contrary indications, and account for the biological phenomena, which have been hitherto explained in terms of eustatic 6 foot and 11 foot benches, will be the next task of geomorphologists interested in coral reefs and islands. Nine samples of highly organic sediments yielded radiocarbon dates between 1000 and 6500 years B.P. for deposition of the peat they represent and were from depths of 5 to over 20 m in the swamps. F.R.F.

Tsuda, R.T. 1971. *Status of Acanthaster planci and coral reefs in the Mariana and Caroline Islands, June 1970 to May 1971. Univ. Guam Marine Lab. Techn. Rept. 2: 1-27.* This brochure is a collection of resurvey reports of the crown-of-thorns starfish situation on the reefs of Truk, Kapingamarangi, Saipan, Tinian, Aguijan, Guam, Rota, Yap, Palau, Ponape, Ant, and the atolls of the central Carolines. These are mostly areas examined by the Westinghouse teams in 1969, and data are being assembled for comparison. Maps and photos accompany the reports. In some areas control measures are being undertaken with, apparently, some success (at least temporarily). Roy Tsuda is to be complimented on getting these informative reports out so promptly and satisfactorily. F.R.F.

Lemon, E. R., et al. 1969. *Biology and ecology of nitrogen, Proceedings of a conference. 1-166, Nat. Acad. Sci., Washington, D.C.* This book contains nothing on islands, but summarizes briefly much of what would be needed to start investigating the nitrogen ecology of coral and other islands. It is flawed a bit by some rather naive taxonomy of certain of the higher plants discussed, but presumably the taxonomy of nitrogen-fixing bacteria is better. One is led to wonder just how adequate the treatment of nitrogen biology and ecology is, since no mention is made of the role of blue-green algae in nitrogen fixing. At least the book is a good place for the beginner to start. Some of the articles have substantial bibliographies. F.R.F.

Balgooy, M.M.J. van, 1971. *Plant geography of the Pacific, Blumea Suppl. 6: 1-222.* Plant geography is one of the most controversy-ridden of sciences. This maybe, partly, because with an amorphous and diffuse mass of information of every degree of reliability (or unreliability), plant geographers tend to choose, usually arbitrarily, very diverse techniques, parameters, and assumptions for the organization of their data. Another reason may be that after the data are organized they are not very interesting or even significant in their own right. The interest is added by what the author of the system does with them, usually by what speculations he introduces, based on them.

This admirable book is no exception to any of the above, though the author has been unusually careful in his selection of the bases for his organizational framework and unusually conservative in his speculations. One is tempted to quarrel with him on a considerable number of points, some large, most small. Many of these derive from his selection, justified at great length, of the genus as the basic unit dealt with in his investigation. A brief review is not the place to debate the propriety of such a choice. Granted this selection as a valid basis for an analysis, Balgooy has done a superb job. He has, moreover, placed Pacific botanists in his debt for compiling the enormous mass of data presented in this volume, and for determining in a generally convincing way the "distribution types" to which all recognized Pacific phanerogam genera belong. One could wish he had used the term Austral for type 7 rather than the misleading "Subantarctic", but this is a minor objection.

He has also analyzed and summarized in a thoroughly satisfactory manner all important previous essays of phytogeographical analysis of Pacific floras. This, in itself, is an enormously useful accomplishment. It also enables us to place his own phytogeographic scheme and conclusions in a far more satisfactory perspective. Our opinion is that the picture presented is a substantial advance over its predecessors. It has shortcomings, of course. These will be remedied only after a vast amount of additional collecting and taxonomic research has been done on Pacific plants, and when a means is found to weave into this picture considerations based on species and groups of species, as well as on genera. We also do not believe that such a scheme can be very sound which does not take into account the geological setting and what is known of the paleogeography of the Pacific.

We cannot refrain from a few comments on Balgooy's findings on dispersal classes and conclusions on how the island floras originated. There may be some virtue in confining assignment of genera to the five functional dispersal classes to cases where the mechanisms involved have actually been seen in operation. However, the inevitable infrequency of such observations

naturally throws most of the genera into his two catchbasket classes, those where he has no opinion on dispersal mechanisms and which are only distinguished by small versus large diaspores. The chance of actually observing a diaspore less than 3 mm in diameter being dispersed by a typhoon is remote, indeed. This does not say anything about the probable frequency of such events, however. We found no mention of the role of either typhoons or "jet-streams" in the discussion of dispersal. Without considering these agencies, in our opinion, no general conclusions on the relation of dispersal to origin of island floras are likely to mean much. F.R.F.

OTHER PUBLICATIONS:

Téthys Supplements. The Station Marine d'Endoume, of the University of Marseille, had been publishing the works of its researchers in a series of Recueil des Travaux..., which was superseded in late 1969 by a quarterly journal, *Téthys*. The supplements to the Recueils, devoted to the works of the Station marine de Tuléar (SW Madagascar) -- which the Endoume Station was largely instrumental in creating and equipping -- have been replaced by a "tropical Indian Ocean" series appearing as supplements to *Téthys*. Two of these were published in 1971. No. 1 includes a list of the contents of the 10 supplements (1962-1970) to the Recueils, with annotations in French and English, and a list, also annotated, of 75 papers on the southwest Indian Ocean published or in press in other journals. The rest of this supplement includes papers on marine life and geology of the Tuléar area and of Réunion Island, where the Endoume Station has a branch station or "Antenne." *Téthys*, supplement 2, is an attempt to define terms used in coral reef morphology as exemplified by the reefs of the Tuléar region. It is presented in parallel French and English columns and is generously illustrated with diagrams and photos. Both supplements are handsomely printed. M.-H. S.

Bibliographies: We have just received two more of Noel L.H. Krauss' excellent little island bibliographies, these on Ontong Java and Rennell and Bellona, all fascinating islands among the westernmost outposts of the Polynesian culture. The Ontong Java booklet has 112 items with dates ranging from 1756 to 1969. The Rennell-Bellona bibliography has 168 items. They are published as nos. 3 and 4 of *Pacific Island Studies*. This series is issued and deposited in selected libraries by Mr. N.L.H. Krauss, 2437 Parker Place, Honolulu, Hawaii 96822, U.S.A.

The Hawaii Institute of Marine Biology issued as its Technical Reports 20 and 21, an annotated bibliography of Kaneohe Bay [Oahu, Hawaii] and a bibliographic species list for the biota of Kaneohe Bay, both by Joleen Aldous Gordon and Philip Helfrich.

Island Bibliographies Supplement, by M.-H. Sachet and F.R. Fosberg, is available from the National Academy of Sciences for \$10.50. A circular announcing its publication has been sent to those on the mailing list of the *Atoll Research Bulletin*. Offset reproductions of the original volume, *Island Bibliographies*, by M.-H. Sachet and F.R. Fosberg, may be obtained from the National Technical Information Service, Springfield, Va. 22151, U.S.A., for \$6.00. Ask for document AD-738566. If you have already tried to get the reproduction of the original volume from NTIS with unsatisfactory results, try again. The difficulties seem to have been corrected and we are assured that there will be no further problem.

From the eminent Pacific historian and documentalist, Professor H.E. Maude, we have received copies of his opening and closing addresses to the Australia Unesco Seminar on Source Materials related to Research in the Pacific Area, held in Canberra, 6-10 Sept. 1971. These papers, *Pacific Documentation: An Introductory Survey*, and *Pacific Bibliography*, were not written for publication, but we certainly hope they will appear in Proceedings of this small and select Seminar, or elsewhere, without being doctored up too much, at least without losing any of the wit and gentle sarcasm of our friend's spoken words.

Bricker, O.P., ed., 1971. *Carbonate cements*. 1-376, The Johns Hopkins Press, Baltimore and London. This remarkable volume reports a symposium held in Bermuda in 1969. A copy for review for the next ARB Island News and Comment number has just come to hand.

Stoddart, D. R. and Yonge, M., eds., 1971. *Regional variation in Indian Ocean Coral Reefs*. 1-572 (Zoological Society of London Symposia 28), London and New York. We have also just received a copy of this for review for the next News and Comment number (see ARB 148: 7-8).

Bablet, J.P., and Cayet, O., eds., 1972. *Le monde vivant des atolls*. Pub. Soc. Océanistes no. 28: 1-148. Illustrated guide to atoll natural history based on the Tuamotus. To be reviewed.

Bakus, G. J. 1969. *Some effects of sedimentation on benthic invertebrates of atoll lagoons*. Mem. Simp. Intern. Lagunas Costeras. UNAM-UNESCO 1967, Mexico 503-504. Abstract. Mentions experiments on sediment deposition on sponges and ascidians in Fanning Island lagoon. Concludes that sedimentation plays an important role in determining which species survive, but that most species were affected adversely.

Barthel, K.W., Janicke, V., and Schairer, G., 1971. *Studies on the coral reef complex of Laisacker near Neuburg a.D (Lower Tithonian, Bavaria)*. N. Jahrb. Geol. Paläont. Monatsheft 1971 (1): 4-23. This is a descriptive account of an upper Jurassic reef of corals and mollusks, with sediment-trapping algae, and showing effects of what are probably clionid sponges. This reef rests on older sponge reefs.

Expédition Française sur les récifs coralliens de la Nouvelle-Calédonie, Vol. 5: 1-307, 1971, is devoted entirely to a memoir on the scleractinian corals of French Melanesia (New Caledonia to New Hebrides), by J.-P. Chevalier, beautifully illustrated with line drawings and 38 plates of photos. See ARB 148: 29, 1971.

Journal of the Marine Biological Association of India, vol. 11 (1 & 2), was issued in April, 1971 and is dedicated to Dr. Santappan Jones. It contains several papers on coral reefs and cays, corals and other marine organisms.

Caribbean Marine Biological Institute, Curaçao . . . Collected Papers, 6(84-97): 1969-1971. The individual papers that seem likely to be of interest to ARB readers are listed as appropriate below, with references to the original places of publication.

Captain Cook's Florilegium. An item in The Times (London), January 17, 1972, announces the imminent appearance of this title, the book being printed by the Royal College of Art from copper plates engraved in 1780. After 200 years' delay, the plates are being used to illustrate plants collected by Joseph Banks on the *Endeavour* voyage, 1768-1771. Only 120 copies will be made. B.D.

Zinderen Bakker Sr., E.M. van, Winterbottom, J. M., and Dyer, R.A., eds. 1971. *Marion & Prince Edward Islands*. Cape Town, A.A. Balkema, xi, 427 pp. Marion and Prince Edward Islands are sub-Antarctic rather than tropical, but the volume is such a good example of a description and interpretation of an island ecosystem that we wish to call our readers' attention to it. It presents the results of the South African Biological and Geological Expedition, 1965-1966, to these bleak volcanoes situated southeast of Cape Town, and is an expedition report in the classic manner. The photos, alone, are worth the reader's time. F.R.F.

BRIEFLY NOTED ITEMS:

Coral Islands of the Western Indian Ocean: ARB 136, on Coral Islands of the Western Indian Ocean, included a series of tables listing the number of species of insects in various orders recorded from each island in the publications of the Percy Sladen Trust Expedition (Farquhar,

table 2; Cosmoledo, table 7; Astove, table 11; Assumption, table 14; Desroches, table 16; Remire, table 18). Since the Bulletin went to press, some additional records have been found in the literature, in papers overlooked when the Bulletin was in preparation. These records are noted below, and the papers themselves should be added to the lists of references on each of the islands.

Farquhar	Diptera	1 species	Bezzi 1923
Cosmoledo	Diptera	1	Austen 1920
Astove	Hemiptera	1	Green and Laing 1921
	Diptera	1	Austen 1920
Assumption	Hemiptera	1	Green and Laing 1921
	Diptera	1	Bezzi 1923
Desroches	Diptera	1	Austen 1920
		1	Bezzi 1923
Remire	Coleoptera	1	Fleutiaux 1922
	Thysanura	1	Carpenter 1916

The references are as follows:

- Austen, E.E. 1920. The Percy Sladen Trust Expedition to the Indian Ocean in 1905, and in 1907-1909, under Mr. J. Stanley Gardiner, M.A. Diptera: Tabanidae. Bull. Ent. Res. 11: 43-45.
- Bezzi, M. 1923. Diptera, Bombyliidae and Myiodaria (Coenosiinae, Muscinae, Calliphorinae, Sarcophaginae, Dexiinae, Tachininae), from the Seychelles and neighbouring islands. Parasitology 15: 75-102.
- Carpenter, G.H. 1916. The Apterygota of the Seychelles. Proc. Roy. Irish Acad. B, 33: 1-70.
- Fleutiaux, E. 1923. Coleoptera: Melasidae et Elateridae des Séchelles et des îles voisines. Trans. Ent. Soc. London 1922: 398-436.
- Green, E.E. and Laing, F. 1921. Coccidae from the Seychelles. Bull. Ent. Res. 12: 125-128. D.R.S.

Additional items on Chagos:

- Feuga, Jean. 1946. L'Emden, croiseur corsaire. Paris, Editions Charcot, 173 pp. Diego Garcia pp. 117-145.
- Fry, H.T. 1967. Early British interest in the Chagos Archipelago and the Maldive Islands. Mariner's Mirror 53: 343-356.
- Spray, W.A. 1970. British surveys in the Chagos Archipelago and attempts to form a settlement at Diego Garcia in the late eighteenth century. Mariner's Mirror 56: 59-76. D.R.S.

Old items omitted from Atoll Bibliography and Supplement:

- Anon. 1830. Some account of the Cocos or Keeling Islands: and of their recent settlement. Gleanings in Science (Calcutta) 2(22): 293-301; reprinted in Jour. Malay. Br. R. Asiatic Soc. 25(4): 174-191, 1952.
- Jagt, H. van der 1831. Beschrijving der Kokos- of Keeling-eilanden. Verh. Batav. Gen. v. Kunsten en Wetenschappen, Batavia 13: 293-322; translated in Jour. Malay. Br. R. Asiatic Soc. 25(4): 148-159, 1952.
- Nesbit, J.C. 1859. The history and properties of the different varieties of natural guanos. London, Rogerson and Tuxford, 1-50 + 2. (listed in Atoll Supplement as not seen). Analyses of guano from Pedro Keys, Swan I., Baker I. (West Indies), Bird I. (St Vincent), Sombrero, Jarvis.
- Ross, J.C. 1836. On the formation of the oceanic islands in general, and of the coralline in particular. Singapore Free press, 2 June 1836; reprinted in Jour. Malay. Br. R. Asiatic Soc. 25(4): 251-260, 1952. D.R.S.

Some recent doctoral theses on coral reef topics:

- Barnes, D.J. 1971. A study of growth, structure and form in modern coral skeletons. University of Newcastle upon Tyne, School of Physics, Department of Geophysics and Planetary Physics. Ph.D. thesis, 180 pp.
- *Buchanan, H. 1970. Environmental stratigraphy of Holocene carbonate sediments near Frazers Hog Cay, British West Indies. Columbia University, Ph.D. thesis, 241 pp.

- *Chase, C.G. 1970. Tectonic history of the Fiji Plateau. University of California at San Diego, Ph.D. thesis, 95 pp.
- *Conaghan, P.J. 1968. Marine geology of the southern tropical shelf, Queensland. University of Queensland Ph.D. thesis, 508 pp.
- *Freeland, G.L. 1971. Carbonate sedimentation in a terrigenous province: the reefs of Veracruz, Mexico. Rice University, Ph.D. thesis, 367 pp.
- *Garrett, P. 1971. The sedimentary record of life on a modern tropical carbonate tidal flat, Andros Island, Bahamas. Johns Hopkins University, Ph.D. thesis, 259 pp.
- *Lang, J.C. 1970. Inter-specific aggression within the scleractinian reef corals. Yale University, Ph.D. thesis, 177 pp.
- *Roberts, H.H. 1969. Recent carbonate sedimentation, North Sound, Grand Cayman Island, British West Indies. Louisiana State University, Ph.D. thesis, 118 pp.
- Till, R. 1968. Some aspects of the geochemistry of recent Bahaman carbonate sediments from the Bimini lagoon. University of Sheffield, Ph.D. thesis, 166 pp.
- *Upchurch, S.B. 1970. Sedimentation on the Bermuda platform. Northwestern University, Ph.D. thesis, 243 pp.
- *Vacher, H.L. 1971. Late Pleistocene sea-level history: Bermuda evidence. Northwestern University, Ph.D. thesis, 186 pp.
- *Ward, W.C. 1970. Diagenesis of Quaternary eolianites of N.E. Quintana Roo, Mexico. Rice University, Ph.D. thesis, 243 pp.
- *Available in microfilm or xerox form from University Microfilms.

D.R.S.

Island papers, terrestrial, compiled by Bryce G. Decker

- Baltzer, F., and Lafond, L.-R. 1971. Marais maritimes tropicaux. Rev. Géogr. Phys. Géol. Dynam. 8(2): 173-196. Considers edaphic regimes of mangrove and other littoral marsh types.
- Beck, H. 1970. Germania in Pacifico. Der deutsche Anteil an der Erschliessung des Pazifischen Beckens. Akad. Wiss. Lit. Mainz Abh. math.-nat. Kl. Jahrg. 1970(3): 233-327. This concise historical account of the contributions by Germans to knowledge of the Pacific area will be welcomed for its extensive bibliography; includes contemporary works.
- Blanc, C.P. 1971. Les reptiles de Madagascar et des îles voisines. Anns. Univ. Madagascar 8: 95-178. Important catalogue and discussion for western Indian Ocean islands, including reef islands. DRS.
- Brownlie, G., and Philipson, W.R. 1971. Pteridophyta of the southern Cook Group. Pac. Sci. 25(4): 502-511. Includes published and recent unpublished records.
- Bryan, W.B. 1971. Coral Sea drift pumice stranded on Eua Island, Tonga, in 1969. Bull. Geol. Soc. Am. 82: 2799-2812. Also includes data from One Tree Island, Great Barrier Reef; unaware of Sachet, 1955. DRS.
- Bullard, E.C. 1957. Gerald Ponsonby Lenox-Conyngham 1866-1956. Biog. Mem. Fellows Roy. Soc. 3: 129-140. Author of paper on Great Barrier Reef, Geog. Jour. 70: 1925.
- Challinor, D., and Wingate, D.B. 1971. The struggle for survival of the Bermuda cedar. Biol. Conserv. 3: 220-222.
- Connell, D.W. 1971. The Great Barrier Reef Conservation issue -- a case history. Biol. Conserv. 3: 249-254.
- Coulson, F.I.E. 1971. The geology of western Vanua Levu (an explanation of Vanua Levu Sheets 3 & 9). Geol. Surv. Dept. (Fiji) Bull. 17: 1-49. Multi-color maps in endpocket; 1: 50,000.

- Cowan, C.F. 1970. The insects of the Coquille voyage. Jour. Soc. Bibl. Nat. Hist. 5: 358-360. Clarifies bibliography and dates of portions of Duperrey's Voyage autour du Monde dealing with insects. FRF.
- Dent, D.W., and Preedy, B.H. 1970. Structure of the troposphere over Gan. Met. Mag. 99: 304-313.
- DeRoy, T. 1972. Giant tortoises on a volcano. Pac. Disc. 25(2): 14-20. Informative popular account of tortoise behavior on Isabella (Albemarle) I.; excellent photos.
- Draeger, R.H., and Lee, R.H. 1953. Meteorological data Eniwetok Atoll. Bethesda, Md., Naval Medical Research Institute, National Naval Medical Center, Memorandum Report 53-8 related to Project NM 006 012.01: 51-71. Tabulation of 1949-50 data, Japtan Islet. DRS.
- Eliasson, U. 1970. Studies in Galapagos plants VIII: Chromosome numbers of some endemic species. Botaniska Notiser 123: 149-154; (IX). New taxonomical and distributional records, 346-357.
- Fisher, M.L. 1970. The albatross of Midway Island: a natural history of the Laysan albatross. 1-164, Carbondale, Southern Illinois Univ. Press; London, Feffer and Simons. \$5.95.
- Gladwin, T. 1970. East is a big bird: navigation and logic on Puluwat Atoll. i-xviii, 1-242, Cambridge, Harvard Univ. Press. \$9.95.
- Goff, M.L. 1971. New records of chiggers (Acarina, Trombiculidae) from the northwestern Hawaiian Islands. Jour. Med. Ent. 8(4): 456. Pearl and Hermes Atoll and Laysan I.
- Gould, S.J. 1969. Character variation in two land snails from the Dutch Leeward Islands: geography, environment and evolution. System. Zool. 18(2): 185-200.
- Heatwole, H. 1971. Marine-dependent terrestrial biotic communities on some cays in the Coral Sea. Ecology 52: 363-366. Bird and invertebrate communities on non-vegetated cays on the Great Barrier Reef, related to marine communities adjacent. FRF.
- Herbst, D. 1971. A new *Euphorbia* (Euphorbiaceae) from Hawaii. Pac. Sci. 25(4): 489-490. *E. haeleleana* from Kauai.
- Lee, B.K.H., and Baker, G.E. 1972. An ecological study of the soil microfungi in a Hawaiian mangrove swamp. Pac. Sci. 26(1): 1-10; Environment and the distribution of microfungi in a Hawaiian mangrove swamp: 11-19.
- Lewis, D. 1971. "Expanding" the target in indigenous navigation. Jour. Pac. Hist. 6: 83-95. Discussion of birds, clouds, swell patterns, horizon brightness, deep phosphorescence and other indicators of proximity of land in the Pacific, based on interviews with islanders during a west Pacific cruise in 1969. DRS.
- Nelson, J.B. 1971. The biology of Abbott's booby *Sula abbotti*. Ibis 113: 429-467. Christmas I., Indian Ocean.
- Odum, H.T. 1971. Environment, power and society. 1-331, New York, London, Sydney, Toronto, Wiley-Interscience. Facing p. 104 is an ecological energy diagram for Lamotrek Atoll, Caroline Is., utilizing data from Alkire, 1965.

- Ono, M. 1967. Chromosome number of *Scalesia* (Compositae), an endemic genus of the Galapagos Islands. Jour. Jap. Bot. 42(12): 353-360. See also Eliasson, 1970, and Ono, 1971 for further counts.
- 1971. Chromosome number of *Scalesia* ... (2). Jour. Jap. Bot. 46(11): 327-334.
- Posnett, N.W., and Reilly, P.M. 1971. Bahamas. Foreign and Commonwealth Office Land Resources Div. Overseas Development Administr., Surbiton (England), Land Resource Bibliography No. 1: 1-74.
- Ramage, C.S. 1970. Monsoon meteorology. 1-304, New York and London, Academic Press. \$15.00. Not seen.
- Rolle, F.J. 1966. Notes on birds from some West Indian islands. *Stahlia* 7: 1-3. Islets off east coast of Puerto Rico, and Isla de Aves, Lesser Antilles. Pineros I., Cabeza de Perros I., Palominos I., Palominos I., Cayo Obispo. FRF.
- Scheer, G. 1960. Eine neue Rasse des Teichreihers *Ardeola grayii* (Sykes) von den Malediven. Senck. Biol. 41: 143-147. Describes Maldivian race of Indian pond heron; notes on occurrence and ecology.
- Schofield, J.C. 1971. Note on high sea-level evidence from Lau Islands, southwest Pacific. N.Z. Jour. Geol. Geophys. 14: 240-241. Tabulation of data from Ladd and Hoffmeister, 1945; main clusterings at ca 550-600, 300-350, 250-275, 200-230, 170-185, 110-130 and 70 ft. DRS.
- Smith, A.C. 1971. Studies of Pacific island plants, XXII; new flowering plants from Fiji. Pac. Sci. 25(4): 491-501. Describes 12 new species in 6 families.
- Vogl, R.J., and Henrickson, J. 1971. Vegetation of an alpine bog on east Maui, Hawaii. Pac. Sci. 25(4): 475-483. Floristic list, notes on occurrence, soils, comparison with other Hawaiian mountain bogs; photos.
- Wagenaar Hummelinck, P., and Roos, P.J. 1969. Een natuurwetenschappelijk onderzoek gericht op het behoud van het Lac op Bonaire. Nieuwe Westind. Gids 47: 1-28, 55 plates. A scientific survey aimed at the preservation of this largest salt lagoon in the Netherlands Antilles.
- Weber, D. 1971. Pinta, Galapagos: une île à sauver. Biol. Conserv. 4(1): 8-12. Native vegetation under severe pressure from goats introduced in 1959; maps; photos.
- Westermann, J.H. 1968. Om het voortbestaan van de flamingo's van Zuid-Bonaire 1957-1968. Nieuwe Westind. Gids 46: 195-231. Conservation of flamingos on South Bonaire.
- Island and reef papers, marine, compiled by Linda Smith*
- Baldwin, W.J. 1972. A new genus and new species of Hawaiian gobiid fish. Pac. Sci. 26(1): 125-128.
- Benjamin, G.J. 1970. Diving into the blue holes of the Bahamas. Nat. Geog. Mag. 138: 347-363. Holes to 230 feet deep.
- Bruce, A.J. 1972. A report on a small collection of pontoniid shrimps from Fiji... Pac. Sci. 26(1): 63-86.

- Bryan, W.H. 1948. H.C. Richards memorial address. Proc. R. Soc. Queensland 59: 141-150. Biographical; bibliography.
- Campbell, A.C., and Ormond, R.F. 1970. The threat of the "Crown-of-thorns" starfish (*Acanthaster planci*) to coral reefs in the Indo-Pacific area: observations on a normal population in the Red Sea. Biol. Conserv. 2: 246-251.
- Coomans, H.E. 1970. Volksnamen voor weekdieren op de Nederlandse Antillen (Vernacular names of molluscs in the Netherlands Antilles). Natuurwet. Werkgroep Ned. Antillen 19: 158-186. Alphabetical and systematic lists.
- Creutzberg, F., et al. 1969. Speciaal Koraalrifnummer. Stinapa No. 4: 1-40.
- Dana, T.F. 1971. On the reef corals of the world's most northern atoll (Kure: Hawaiian Archipelago). Pac. Sci. 25: 80-87.
- Faure, G., and Montaggioni, L. 1971. Les récifs coralliens Sous-Le-Vent de l'île Maurice (Archipel des Mascareignes, Océan Indien): morphologie et bionomie de la pente externe. C.R. Acad. Sci. Paris 273,D: 1914-1916.
- Franzisket, L. 1970. Zur Ökologie der Fadenalgen im skelett lebender Riffkorallen. Zool. Jahrb., Abt. für allg. Zool. und Physiol. der Tiere 74: 246-263.
- Gallagher, B.S., et al. 1971. Tides and currents in Fanning Atoll lagoon. Pac. Sci. 25(2): 191-205.
- Gardiner, J.S. 1932. The Great Barrier and the formation of coral reefs. Nature 129: 748-749.
- Gerlach, S.A. 1961. Ueber Gastrotrichen aus dem Meeressand des Malediven. Zool. Anz. 167: 471-475.
- Gordon, D.C., Jr. 1971. Organic carbon budget of Fanning Island lagoon. Pac. Sci. 25(2): 222-227.
- Gordon, D.C., Jr., Fournier, R.O., and Krasnick, G.J. 1971. Note on the planktonic primary production in Fanning Island lagoon. Pac. Sci. 25(2): 228-233.
- Gosline, W.A. 1971a. Functional morphology and classification of teleostean fishes. 1-208, Honolulu, Univ. Hawaii Press. A general treatise on fishes, not emphasizing island fishes, but very likely of interest to many of our marine biologist readers. FRF.
- 1971b. The zoogeographic relationships of Fanning Island inshore fishes. Pac. Sci. 25(2): 282-289.
- Guinther, E.B. 1971. Ecologic observations on an estuarine environment at Fanning Atoll. Pac. Sci. 25(2): 249-259.
- Guppy, H.B. 1886. The coral reefs of the Solomon Islands. Nature 35: 77-78.
- Henry, D.P. 1958. Intertidal barnacles of Bermuda. Jour. Mar. Res. 17: 215-234.
- Hoek, C. van den. 1969a. Algal vegetation-types along the open coasts of Curaçao, Netherlands Antilles. I, II. Proc. Koninkl. Nederl. Akad. van Wetensch. C, 72(5): 537-577.

- Hoek, C. van den. 1969b. Notes on *Cladophora* (Chlorophyceae). I, II, Jour. Phycol. 5(2): 128-134, 134-136.
- Holeman, J. and Kohn, A.J. 1970. The identity of *Conus mappa* (Lightfoot), *C. insularis* Gmelin, *C. aurantius* Hwass in Bruguière, and Hwass's infraspecific taxa of *C. cedonulli*. Jour. Conch. 27: 135-137.
- Johannes, R.E., and Wiebe, W.J. 1970. Method for determination of coral tissue biomass and composition. Limnol. Oceanog. 15: 822-824.
- Kay, E.A. 1971. The littoral marine molluscs of Fanning Island. Pac. Sci. 25(2): 260-281.
- Kohn, A.J. 1970. Food habits of the gastropod *Mitra litterata* Lamarck: relation to trophic structure of the intertidal marine bench community in Hawaii. Pac. Sci. 24(4): 483-486.
- 1971. Diversity, utilization of resources, and adaptive radiation in shallow-water marine invertebrates of tropical oceanic islands. Limnol. Oceanog. 16(2): 332-348.
- Kühlmann, D.H.H. 1970a. Studien über physikalische and chemische Faktoren in kubanischen Riffgebieten. Acta Hydrophysica 15(2): 105-152. Much more extensive discussions of Cuban coral reef topics in this and other items appear in Kühlmann, 1971b. English summary.
- 1970b. Die Korallenriffe Kubas. I. Genese und Evolution (The coral reefs of Cuba. I. Genesis and evolution). Int. Revue gesamte Hydrobiol. 55(5): 729-756. English summary.
- 1971a. Die Korallenriffe Kubas. II. Zur Ökologie der Bankriffe und ihrer Korallen (The coral reefs of Cuba. II. On the ecology of the bank reefs and their corals). Int. Revue gesamte Hydrobiol. 56(2): 145-199. English summary.
- 1971b. Die Entstehung des westindischen Korallenriffgebietes (The origin of the West Indian field of coral reefs). Wiss. Zeitschrift Humboldt-Univ. Berlin, Math.-Nat. R. 20(4/5): 675-695; Zur Methodik der Korallenriffuntersuchung (On the methods of studying coral reefs): 697-705; Über einige physikalische und chemische Faktoren in kubanischen Korallenriffgebieten (On some physical and chemical factors in Cuban coral reef areas): 707-719; Untersuchungen zur Ökologie und Entstehung kubanischer Bank-Riffe (Studies on the ecology and the origin of Cuban bank reefs): 721-775. English summaries.
- Lawrence, J.M. 1972. Carbohydrate and lipid levels in the intestine of *Holothuria atra* (Echinodermata, Holothuroidea). Pac. Sci. 26(1): 114-116.
- Lewis, J.B., et al. 1968. Comparative growth rates of some reef corals in the Caribbean. McGill Univ. Marine Sciences Manuscript Rept. 10: 1-26.
- 1969. Latitudinal differences in growth rates of some intertidal marine molluscs in the Caribbean. McGill Univ. Marine Sciences Manuscript Rept. 12: 1-89.
- Marcus, E., and Marcus, E. du Bois-Reymond. 1970. Opisthobranchs from Curaçao and faunistically related regions. Studies on the fauna of Curaçao and other Caribbean islands 33(122): 1-129.
- Maxwell, W.G.H. 1970. Deltaic patterns in reefs. Deep Sea Res. 17: 1005-1018.

- McGill University. 1970. Annual Report, Marine Sciences Centre: 1-40. Scope of studies includes Caribbean.
- Meyer, D.L. 1969. Functional morphology and living habits of shallow water unstalked crinoids of the Caribbean Sea. Abstract of paper presented at annual meeting, Geol. Soc. Amer., Atlantic City, Nov. 12, 1969.
- 1971. The collagenous nature of problematical ligaments in crinoids (Echinodermata). *Marine Biology* 9(3): 235-241.
- Newell, N.D. 1971. An outline history of tropical organic reefs. *Am. Mus. Novit.* 2465: 1-37. A paleobiologist's view of the evolution of coral reef ecosystems as interpreted from the unusually complete fossil record.
- Ohata, C.A., et al. 1972. Diurnal rhythm of body temperature in the Hawaiian monk seal (*Monachus schauinslandi*). *Pac. Sci.* 26(1): 117-120.
- Pearson, R.G., and Endean, R. 1969. A preliminary study of the coral predator *Acanthaster planci* (L.) (Asteroidea) on the Great Barrier Reef. Dept. of Harbours and Marine (Qld) Fisheries Notes 3(1): 29-55.
- Qasim, S.Z. 1970. Some characteristics of a *Trichodesmium* bloom in the Laccadives. *Deep-Sea Res.* 17: 655-660.
- Renaud-Mornat, J.C., Salvat, B., and Bossy, C. 1971. Macrobenthos and meiobenthos from the closed lagoon of a Polynesian atoll, Maturei Vavao (Tuamotu). *Biotropica* 3: 36-55. Gives brief description of atoll, quantitative sampling and analysis of lagoon fauna and sediments; map; diagrams; photos; comparison with Mururoa Atoll.
- Roy, K.J., and Smith, S.V. 1971. Sedimentation and coral reef development in turbid water: Fanning Lagoon. *Pac. Sci.* 25(2): 234-248.
- Salvat, B., and Ehrhardt, J.P. 1970. Mollusques de l'île Clipperton. *Bull. Mus. Hist. Nat. Paris* 42(1): 223-231.
- Smith, D.P. 1969. Daily migrations of tropical sea urchins. *Am. Zool.* 9: 1075. Abstract of motion picture. Curaçao.
- Smith, S.V. 1971. Factor analysis: a tool for environmental studies. *Mar. Tech. Soc. Jour.* 5(6): 15-19.
- Smith, S.V. et al. 1971. Flux of suspended calcium carbonate (CaCO₃), Fanning Island lagoon. *Pac. Sci.* 25(2): 206-221.
- Stacey, C.C.D. 1971. Coral islands: their origins and morphology, with reference to the Maldives Islands. *Don (Sheffield Univ. Geog. Soc.)* 14: 31-33. Worthless discussion of major reef theories as they apply to the Maldives mainly based on Davis, The coral reef problem, 1928; based on a visit to Gan but with no field observations of any value.
- DRS.
- Stock, J.H. 1970. Notodelphyidae and Botryllophilidae (Copepoda) from the West Indies. *Studies on the Fauna of Curaçao and other Caribbean islands* 34(123): 1-45.

- Stringfield, V.T., and Legrand, H.E. 1971. Effects of karst features on circulation of water in carbonate rocks in coastal areas. *Jour. Hydrol.* 14: 139-157. Andros blue holes.
- Summerhayes, C.P. 1971. Lagoonal sedimentation at Aitutaki and Manuae in the Cook Islands: a reconnaissance survey. *N.Z. Jour. Geol. Geophys.* 14: 351-363.
- Tixier-Durivault, A. 1957. Les Alcyonaires du Muséum. 1. Famille des Alcyoniidae - - IV. Genre *Lobophytum* (fin.) *Bull. Mus. Hist. Nat. Paris II*, 29: 106-111. *L. venustum* n. sp. from Aldabra.
- Tsuda, R.T., Larson, H.K., and Lujan, R.J. 1972. Algal growth on beaks of live parrotfishes. *Pac. Sci.* 26(1): 20-23.
- Uchupi, E., et al. 1971. Structure and origin of southeastern Bahamas. *Bull. Am. Ass. Petr. Geol.* 55: 687-704.
- Van Dorn, W.G. 1970. Tsunami response at Wake Island: a model study. *Jour. Mar. Res.* 28: 336-344.
- Vastano, A.C., and Reid, R.O. 1970. Tsunami responses at Wake Island: comparison of the hydraulic and numerical approaches. *Jour. Mar. Res.* 28: 345-356.
- Veevers, J.J. 1969. Palaeogeography of the Timor Sea region. *Palaeogeog. Palaeoclim. Palaeoecol.* 6: 125-140. Deep well dug on Ashmore Reef, Timor Sea: 2376 m carbonates back to Upper Cretaceous, mostly shallow water.
- Womersley, H.B.S. and Bailey, A. 1970. Marine algae of the Solomon Islands. *Phil. Trans. R. Soc. London B*, 259: 257-352.
- Yonge, C.M. 1962a. Dr. A.P. Orr. *Nature* 196: 719. Member Great Barrier Reef Expedition 1928-1929.
- 1962b. Thomas Alan Stephenson 1898-1961. *Biogr. Mem. Fellows R. Soc. London* 9: 137-148. Obituary.