

ATOLL RESEARCH BULLETIN

No. 94

Atoll News and Comments

Christmas Island

As everyone knows from newspaper accounts, Christmas Island has been, during the past summer, the site of a new series of atomic tests. Undoubtedly some scientific work on the island has been conducted in connection with these tests, but we have little information of it. An issue of the Pacific Science Board Bulletin for December 1, 1952 says that the fisheries and climatological research vessel, Charles F. Gilbert, from Honolulu, has been participating in the project. It cooperated with the military weapons tests at Christmas Island. In cooperation with the USO and the laboratory of the University of Washington they are collecting samples of animals to determine their possible effects on the nuclear tests.

Due to the fact that the island is uninhabited, the study of the ecology of the island is of great interest. It is a very good example of a natural island. The island is a good example of a natural island. The island is a good example of a natural island. The island is a good example of a natural island.

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Atoll News and Comments

It is hoped that we can continue this series, gathering together, from time to time, items that we think may interest the readers of the Bulletin, as well as including brief observations, short notes of one page or less, that it would be impractical to issue as separate numbers. Signed or unsigned reviews or notes are welcome (unsigned ones will be used if they do not contain libellous or uninteresting material and if they are not likely to misrepresent the editors' views). If it is important that announcements be phrased in a particular manner, it will be better to send them in with the exact wording desired.

Current events

Christmas Island:

As everyone knows from newspaper accounts, Christmas Island has been, during the past summer, the site of a new series of atomic weapons tests. Undoubtedly some scientific work on the atoll has been conducted in connection with these tests, but we have little information on it. An announcement in Pacific Science Association Information Bulletin 14(3): 9, 1962 says that the fisheries and oceanographic research vessel Charles H. Gilbert, from Honolulu, has been "participating in biological surveys connected with the nuclear weapons tests at Christmas Island in May," in cooperation with the AEC and the Laboratory of Radiation Biology of the University of Washington. They are collecting samples of animals to "examine them for possible effects of the nuclear tests."

Due to the test series, the planned investigation of the ecology of the sooty tern colony there, noted in ARB 84, p. 1, has had to be abandoned, according to a communication from Philip Ashmole, of Oxford University, who was planning the expedition. It seems a great pity that an intensive investigation of Christmas Island could not have been undertaken before the test series started, as it is certainly one of the most interesting of all coral atolls. The amount of damage it is suffering as a result of the tests is not known but is doubtless considerable.

The Natural History Society (Christmas Island) and its Bulletin: We have secured, thanks to the kindness of Major M. D. Gallagher, a set of the Bulletins of the Society through no. 11 (lacking no. 2, which was superseded by no. 9). This rare publication contains many observations, principally on the birds of the island. The observations on birds have been adequately summarized by Maj. Gallagher in the Ibis (Bird notes from Christmas Island, Pacific Ocean, Ibis 102: 489-502, 1960); this paper includes also a description of the island, with map, notes on climate and vegetation and some mention of some of the island fauna. A description of the Bulletin may be of interest and is given below.

"The Society was formed on Saturday 6 Sep 58 for the purpose of fostering interest in wild life on Christmas Island." As far as we have been able to find out, it did not long survive the departure from Christmas I. of its founder and moving spirit, Maj. Gallagher. During its short existence, however, the Society issued 11 mimeographed or offset Bulletins. As far as we are aware, two sets of these are available outside the island,

one at the Bishop Museum, and one in the files of the Pacific Vegetation Project. The contents of these Bulletins will be listed below, and certain portions not covered in the Ibis article quoted with the permission of Major Gallagher. Besides the publication of the Bulletin, the activities of the Society consisted in meetings, held at one or two weeks interval, with discussions, showings of photos and films, and in field trips, including visits to the three bird sanctuary islets which were established to protect bird life when the British tests of atomic devices were started, and which could be visited only by special permission of the Base Commander.

The material in the Bulletins is arranged under various headings, which are numbered consecutively from one issue to the next. These numbers and headings will be used below.

Bulletin No.1, 17 Sep 58

1. The Society
2. Bulletins
3. Visit to Motu Upua - 14 Sep 58. (This is one of the bird sanctuaries, and notes on various birds are included in this paragraph).
4. Meeting 15 Sep 58
5. Coming events
6. Membership (17 Founding members are listed).

Bulletin No. 2

(This Bulletin was superseded by No. 9, and we do not have a copy. It consisted in a list of Christmas Island birds.)

Bulletin No. 3, 14 Oct 58

Introduction

8. Cook Island - 20 Sep 58 (A field trip to this bird reserve islet, with notes on birds observed).
9. Manulu Lagoon- 20/21 Sep 58. Field trip to islets in this large lagoon.
10. Meeting - 29 Sep 58
11. Meeting - 6 Oct 58 (Includes recent observations on birds).
12. Observations - 25 July to 13 Aug 58 (on birds).

Bulletin No.4, 10 Nov 58

13. Meeting - 21 Oct 58
14. Mota Tabu - 25 Oct. 58 (A field trip to this bird reserve, with notes on birds observed).
15. Mota Tabu - 2 Nov 58
16. Meeting - 3 Nov 58 (Birds and plants were discussed). To paragraph 20.

Bulletin No. 5, December 1958

21. Meetings
22. Cook Island - 16 Nov 58 (notes on birds seen).
23. Malden Island - 31 Oct 58 (see below)
24. Mota Tabu - 9 Nov 58 (Field trip, notes on birds).
25. Duck (notes on various ducks observed in patches of partly salt water near Main Camp in November).
- 26-28. Notes on various birds.

29. Manulu Lagoon - Nov 58 (Several visits in November, with notes on birds seen).
30. Mota Upua - 30 Nov 58 (Field trip, with notes on birds).

Bulletin No. 6, January 1959

This Bulletin is offset, and is not numbered like the others, but consists in an introduction, and illustrated accounts of 20 plants, with Latin, English and Gilbertese names. See below for list of species.

Bulletin No. 7, 2 Feb 59

Introduction

31. Meetings

32-43. (Extensive notes on various birds).

Bulletin No. 8, 18 March 1959

44-58. (Extensive notes on birds observed in Dec. 58 to March 59).

Bulletin No. 9, March 1959

This Bulletin is offset, and is not numbered like the others. The title is: Bird life on Christmas Island. It includes: Introduction, Topography of a bird (with drawings and list of parts), and descriptive notes, with illustrations, on 27 species of birds, listed under the headings Sea birds, Resident land birds, and Migratory birds. There is also a sketch-map of the island.

Bulletin No. 10, 20 April 1959

59. The weather (includes a table of rainfall for several years, which is reproduced and expanded in the Ibis article).
60. Visit to Mota Tabu - 4 April 59 (notes on birds seen).
- 61-78. (Notes on birds observed and their habits).

Bulletin No. 11, 1 June 59

79. The Secretary (announces the departure from Christmas of Maj. Gallagher).
80. The weather
81. Visit to Mota Tabu - 2 May 59 (notes on birds observed).
82. Cook Island - 17 May 59 (notes on birds observed).
83. Other reports (other observations of birds).

Excerpts from the Bulletins

Bull. 4, par. 13:

Manta ray: Several manta rays reported seen in the sea off the S.E. point from a helicopter. A leopard ray was photographed in the lagoon.
Dead birds: Many dead birds, mostly shearwater, have been found along the SPAL road. The cause of their death is not evident.

Bull. 4, par. 14:

Large number of dead birds were found (on a visit to Motu Tabu). Many of these had obviously become caught in the undergrowth; these included blue-grey noddies and petrels.

Bull. 4, par. 16:

It was reported that there were a large number of dead fish near the SPAL road. These are believed to swim into an island lagoon on a very high tide to spawn, but owing to recent lack of rain and the low level of water in this lagoon the fish have been unable to regain their freedom in the sea. Over 1500 have been buried or burnt but there are many more. The birds will not touch the dead fish.

Bull. 4, par. 20:

Plants: It has been suggested that members might like to collect seed specimens which drift upon the beaches, such as the Bay of Wrecks as they serve as valuable records of the dispersal of ocean-borne seeds.

Bull. 5, par. 23:

Malden Island - 31 Oct 58. (This paragraph reproduced in its entirety).

Three members spent about 4 hrs on the Island on 31 Oct 58 arriving at midday and leaving at 4 pm (CI time) and observed the following birds some of which were photographed.

White tern: 4 seen in flight.

Wandering tattler: 2 seen feeding at edge of water near reef.

Red tailed tropic bird: 1 seen in flight only.

Blue faced booby: About 10 of these birds were seen on the ground along the shore of the lagoon. Several more were seen in the air. Some of the birds had single eggs and others had young birds probably a few months old, on the nest which consisted in all cases of a shallow depression in ground.

Frigate bird: None seen close to though a large flock of black birds, believed to be Frigate birds, were seen as aeroplane circled Island after take off.

Mice: Certain very small type of mouse seen in abundance about 1"-2" long.

Wild pig: Reported to still exist in very small numbers on Malden Island but none were seen.

Fish: A few fish about 9-12" long seen on the reef, black and bright scarlet.

In general there appeared to be few birds on the Island, but this may have been due to the time of day. Although the Island is green it is believed there are now only about 2 bushes and 3 trees! Some plants were brought back and identified as:-

Boerhavia diffusa, a prostrate vine-like herb.

Portulaca lutea, an erect pig weed or purslane with yellow flowers and fleshy stem.

Sesuvium portulacastrum, a prostrate 'seaside-purslane' with finger like leaves and mauve flowers.

Lepturus repens, 'bunch' or 'wire' grass with stiff flower stalks.

Tribulus cistoides, a trailing herb with yellow flowers and thorny fruit like sets of miniature cow's horns.

These are common on parts of Christmas Island.

Bull. 6: Vegetation on Christmas Island.

After a brief Introduction, 20 plants are listed, described and illustrated. They are:

1. Pandanus tectorius (Screw pine) (Te Kaina): A few trees planted at Four Wells, London Village and Poland.

2. Lepturus repens (Bunch grass). Most common perennial grass on Island.

3. Digitaria pacifica
4. Eleusine indica
5. Eragrostis amabilis
6. Cenchrus echinatus
7. Cocos nucifera. Now over 600,000 palms.
8. Boerhavia diffusa (also B. tetrandra and B. hirsuta) (Te Wao). Widespread.
9. Pisonia grandis (Buka tree). Some trees on Mota Tabu and at SE corner.
10. Portulaca lutea (pigweed) (Te Boi)
11. Portulaca oleracea (purslane)
12. Sesuvium portulacastrum (seaside purslane). On mud flats and near water holes.
13. Cassytha filiformis (laurel dodder) (Te Ntanini)
14. Tribulus cistoides (puncture vine) (Te Maukinikin). Widespread.
15. Suriana maritima. Grows extensively over the lagoon mud flats.
16. Sida fallax (te Kaura) (also Sida cordifolia). Widespread, often as thickets.
17. Heliotropium anomalum (Beach heliotrope). Extensively behind beaches and elsewhere.
18. Messerschmidia argentea (Tree heliotrope) (Te Ren). Along beach crests and elsewhere.
19. Scaevola frutescens (Beach scaevola) (Te Mao).
20. Pluchea odorata (Sour bush) (Te Aronga). Amongst coconut palms near JOC, airfield and elsewhere.

Blasting on Central Pacific Reefs

We are informed by Capt. W.M.R. Addison, of the Royal Engineers, of a current program of blasting boat channels through the reefs of a number of atolls in the Gilbert, Ellice and Phoenix groups. Plans call for channels 15 feet wide and 1 to 4 feet deep, also for some blasting out of coral heads in at least the Tarawa Lagoon. The atolls included in the program are Nui, Tamana, Nanumanga, Arorae, Beru, Aranuka, Marakei, Tarawa, Gardner, Hull, and Sydney, and possibly Maina, Makin, Niutao or Nukulaelae. This work is under way at present and is expected to be finished by December 1, 1962. Unfortunately it was started without any preliminary ecological work at all, so there will be another case of difficulty in measuring the changes brought about by man's activity. In this way, only spectacular or disastrous consequences are ever confidently ascribed to their causes.

Capt. Addison has sent a copy of a report containing a number of very interesting observations made at Beru, Gilberts, and has promised to gather data of a number of sorts on the islands to be visited later in the program. We hope to be able to utilize the pertinent part of this information in a later issue of Atoll Research Bulletin.

Clipperton Island: Errata and addenda, ARB 86

In Bulletin 86, Table 3 (after p. 24), instead of MacDonald, read McDonald. Column "% observations reporting precipitation ...", for December should read "Clipperton between 25 & 30% isograms;" for January, should read "Clipperton between 15 & 25% isograms."

Since the publication of ARB 86, the following papers have come to hand:

Balech, E.

Glenodinium cristatum, sp. nov. (Dinoflagellata).

Neotropica 7(23): 47-51, 1961.

This is the Glenodinium sp. mentioned p. 92, described from Clipperton (also mentioned in Sachet, 1962, Flora and vegetation of Clipperton Island, p. 268).

Bennett, Raine

The Madonna of Passion Isle.

American Weekly, 10-11, Jan. 10, 1954.

Fanciful account of the 1917 rescue of the Mexican women and children.

Chace, Fenner A., Jr.

The non-brachyuran decapod crustacea of Clipperton Island.

Proc. U. S. Nat. Mus. 113: 605-635, 1962.

Includes very interesting table showing distribution of Clipperton species, and bringing out the island's strategic biogeographic location.

Howell, T. R.

Land birds from Clipperton Island.

Condor 61: 155-156, 1959.

Several species observed and 3 collected by Wayne Baldwin in 1956; all are species that breed in Eastern United States.

Lowry, G. M.

The Clipperton operation.

U. S. Naval Inst. Proc. 88(2): 170-171, 1962.

Account of the loss of LST 563 in Dec. 1944.

Sachet, M.-H.

Monographie physique et biologique de l'île Clipperton.

Ann. Inst. Océanogr. 40: 1-108, 1962.

Includes 12 plates of photos.

Urquizo, F. L.

El Capitan Arnaud.

1-107, Mexico, 1954.

Rather pathetic attempt at a biography of Capt. de Arnaud, and the the fate of the Mexican families abandoned on Clipperton in 1914. Hardly any new information, and no indication of sources.

Clipperton Island was in the news once more in Feb.-March 1962, when the San Diego tuna clipper M/V Monarch sank nearby, and the crew of 9 spent 23 days on the island (Feb. 6-March 1), awaiting rescue. Mr. W. L. Klawe, of the Inter-American Tropical Tuna Commission recently was able to interview Mr. Robert A. McCorckle, the navigator, and kindly put a tape-recording of their conversation at our disposal. From this, the notes of scientific interest have been summarized and are presented below; comments by the assistant editor are included in (). A narrative of the more dramatic aspects of the fishermen's adventure and rescue, together with some background information on Clipperton and the tuna fishing industry, has been accepted for publication by Argosy Magazine. We look forward to reading this account, and in the meantime, express our gratitude to the participants in the interview.

The Monarch sank at 9 a.m., and by 3 p.m., the crew had landed on shore after salvaging fishing lines, a box of fish hooks, some potatoes and a sack of onions from the sinking vessel. Shown the map of Clipperton included in ARB 86, Mr. McCorckle indicated the landing place as just north of the apron of deeper reef on the northwest side; from there they walked to the coconut grove. There was a slight sea, and landing through the "surf" (the breakers at the edge of the reef) offered difficulties, but there were capable oarsmen in the skiff, and they got ashore relatively easily. The large skiff in which they landed was lost over night, a smaller one, pulled higher on the beach, remained and turned out to be invaluable in that it permitted fishing in the ocean.

The quonsets of the old Weather Station in the coconut grove were found to be "in a state of collapse, of decay" so could not be used, but a shelter was built of old bags of cement, now solidified, and sheets of corrugated metal, and patched together with pieces of wood. It was adequate for the tropical climate.

Weather: Mr. McCorckle was a weather officer with the Air Force for 10 years, but felt a bit rusty on terminology. Visibility was at all times excellent. Cloud cover: sky condition "broken", middle and high clouds, cirrus, altocumulus, altostratus and stratus, with very few low clouds. Rainfall: it rained practically all night the first night, not a heavy rain of a storm type, but a "typical tropical rain" (meaning probably typical trade-wind rain). There was not "lots of rain", in fact, "for the tropics, very little rain." There were perhaps 6 nights out of 23 when it rained, and there was no rain during the day. (These observations are of extreme interest, in view of the total lack of weather data from Clipperton at that time of year. They confirm the idea expressed in ARB 86, pp. 20-21, table 3 and passim that there is a drier season in the first months of the year). Wind: The northeast trades never varied, except for slight fluctuations from NE to E or even occasionally to SE. There was nothing more westerly than NE or SE. There was surf (breakers) around the island all the time, even when it was calm. Humidity: "Humid, as it always is in the tropics, but the weather for February had far less rain than you would find elsewhere in the tropics." Temperature: The nights were cooler than the days, but still hot, probably not getting below 80°. Days quite warm, but not uncomfortably so (probably on account of the constant tradewinds). Fishermen are used to the sun, they were all

already quite brown, so none suffered from sunburn. In fact none was sick or had any complaint during the whole stay, except for one man whose foot was crushed between the skiff and the sinking vessel, and who has not yet really recovered.

Lagoon: Water was drinkable, but muddy and dirty; some men used it for drinking, but supply of drinking coconuts made it unnecessary for the most part. It tasted not good, but apparently Mr. McCorckle did not find it noticeably salty. The water could have been used for cooking, but actually sea water was used. No fish was seen in the lagoon, but it was not looked for. The lagoon was full of floating plant growth, gathering near shore at times, as it moved with the wind. "I kept imagining that I could see the tide inside the lagoon ... Oh, I know there was" (a movement of the water inside the lagoon).

Vegetation: Asked whether the vegetation was dry or green, Mr. McCorckle said green. (Probably, the type of effect of the drier weather on the vegetation noted by Mr. Klave in May 1958 (ARB 86, p. 21) had not made itself felt as yet. Similarly, the lagoon water had not yet become much saltier than during the rainy summer). The vines (Ipomoea pes-caprae), which to Mr. McCorckle's view formed most of the plant cover, were flowering "not abundantly but in patches." Shown the photos of the devastated north-east side (Monographie physique et biologique, 1962), he thought that area still devoid of vegetation (he did not walk all around the island, although others did, but the devastated area, if still bare, would be noticeable from the top of the ridge on the northwest side where they landed and later fished). Drift-wood was not obvious, but they did see some large stumps (when shown Allison's photo of a drift tree in the Monographie).

Food: There were all sizes of coconuts available; they were abundant, but when rescued, the fishermen were beginning to worry, as the supply was getting low. They got the nuts by climbing the shorter trees and by knocking the nuts off the taller ones with old pieces of pipe found in the old quonsets and with hooks attached. The quonsets also furnished all lumber for firewood. Potatoes and onions were boiled in sea water. Fish was boiled, or grilled on a piece of metal, as on a barbecue. They tried a few birds' eggs but found them "rancid and ready to hatch," so gave them up. They killed a few of the "little black birds" (noddies?) but decided they had too little meat on them. Mostly they fished. There were "few fish inside the breakwater" (on the reef flat) and they had to be speared, so it was much easier to fish in the open sea, with the small skiff. They caught only "cabrilla" (a grouper, Epinephelus), ranging from 8 to 20 pounds. For bait, they used "a longish fish, perhaps like an eel" found on the reef (probably moray eels, which are extremely abundant on the reef, although when asked if these fish tried to bite, Mr. McCorckle said no).

Marine life: In addition to the above, they saw when they were fishing in the open ocean some porpoises (probably black porpoises, Tursiops), schools of tuna, which of course they could not catch, no jack (Carangidae), no black skipjack (Scombridae), no seal or sea-lions, and no turtles. Occasionally a small shark could be seen inside the breakwater (on the

reef flat). There were quite a few lobsters on the reef (most likely Panulirus penicillatus), a few were caught at low tide; no shrimps were noticed. Many shells could be picked up on the beaches.

Land animals: (At the time of the rescue, the newspapers reported pigs on the island, but they must have extracted this information from their "morgues," as the fishermen saw only skeletons). Mr. McCorckle felt sure that there were no living pigs left. Birds: Mr. McCorckle is not especially familiar with birds, but mentioned Man o'war birds, albatrosses (boobies?) and gulls (terns?), and lots of little black birds (very likely noddies, but could be sooty terns). When shown the photos included in the Monographie, he recognized the fairy terns, of which there were a few, the boobies, of which there were lots, and the frigates, equally abundant. There were a few little lizards, very fast (obviously the skinks), and no rats or mice. There were millions and millions of land crabs, annoying and inquisitive, but not bothersome (one wonders if the crabs have already increased as a result of the removal of the pigs in 1958, one would not then have described them as in millions and millions). They did not try to eat them. Of insects, only some flies and ants were noted, they were not bothersome. Centipedes were not noticed.

A bottle containing a message was picked up on the beach. It had been thrown overboard in the Panama canal (more likely in the Bay of Panama at Balboa) in Sept. 1960.

The crew of the Monarch was found on Feb. 27 by two small fishing boats, fishing for sharks. Their rescuers radioed another boat, located near Soccoro Island, Revillagigedo group, which in turn notified the Coast Guard, which alerted the Navy, which sent the destroyer U.S.S. Robison, then in El Salvador, to pick up the castaways.

Of these important pieces of information, the most valuable is no doubt that on the weather. The drier weather in the early part of the year was also confirmed from another source. Lt (now Commander) R. E. Kerr, who discovered and rescued in 1917 the Mexican women and children abandoned on Clipperton, kindly shared his vivid recollections of the episode with the assistant editor in an interview in August 1962. He remembers very clearly that Señora de Arnaud told him that they depended entirely on rain water for drinking purposes, which they collected in old boats (at that time there were only 6 coconut palms on the island), and that they used to worry about their depleting supply in the early spring. We are happy to be able to piece together such information, since the only "professional" weather data ever collected on the island, by the weather station of 1945, have never been available and are reported lost.

Marshall Islands:

It has just come to our attention that a revised edition of Atoll Research Bulletin No. 11, Land tenure in the Marshall Islands, was published in 1956. The revisions in this were extensive, the number of pages being increased from 36 to 67, with addition of much material of great interest. Although this purports to have been "Issued by the PACIFIC SCIENCE BOARD, National Research Council ... (Revised - June, 1956)", we have no knowledge of it, so cannot give any information on where it was issued nor how it can be secured. The editors do not even have a copy.

Laysan:

A paper by Richard E. Warner, entitled Recent history and ecology of the Laysan duck, is in press and will appear in 1963 in the journal Condor. A book on the natural history and ecology of Laysan Island, prepared jointly by members of the Harold J. Coolidge 1961 expedition to that island and under the editorship of Drs. Robert L. Usinger and A. Starker Leopold is in the last stages of preparation. It will appear as a technical publication of the University of California Press in 1963. An account of the expedition was presented by Dr. Miklos D.F. Udvardy in Elepaio 22(6): 43-47, Dec. 1961 (see also ARB 84, p. 1). ARB 79 reported some observations made on atolls other than Laysan during that expedition, and including notes on the invasion by weedy plants of recently disturbed islets of French Frigate Shoal and Kure. Richard E. Warner reports that, paralleling this invasion, changes in the fauna of Green Island, Kure, were observed. An astonishing number of newly introduced insects were found. There was an unconfirmed report of the presence of one species of snake on the island. It was also reported that the Hawaiian rat (Rattus hawaiiensis, or perhaps R. exulans?) a species apparently transported there by the early Hawaiians, had experienced a population eruption shortly after the arrival of military personnel. A vigorous poisoning campaign was instituted and at the time of the expedition's visit, only one dead and quite dried-up specimen was found.

Maldivé Bibliography:

Mr. E. W. Groves, of the British Museum (Natural History) writes that he is compiling a bibliography on the Maldivé, Laccadive, and Chagos archipelagoes, in the central Indian Ocean, groups entirely composed of atolls. We have, as yet, no information on where it will be published, but are awaiting its appearance with interest.

Cayo Arcas:

The reefs around Cayo Arcas, northwest of Yucatan, are being studied by the Department of Oceanography and Meteorology of Texas A. & M. College. During the past year the atoll has been visited by two expeditions, aboard the oceanographic vessel Hidalgo, under the direction of Dr. Louis S. Kornicker. Apparatus is being installed to measure current, tide, wave, and other energy components to try to relate them to reef growth. On the

second of these trips some work was done on shore, including the mapping of the vegetation by Mr. Max Pitcher, of Columbia University. Plant collections made by him were identified by F. R. Fosberg:

- | | |
|---|---------------------------------------|
| A. Sporobolus virginicus L. | M. Scaevola plumieri (L.)L. |
| B. Ipomoea tuba (Schlecht) G. Don | N. Hymenocallis littoralis |
| C. Amaranthus sp. (possibly A. greggi) | (Jacq.) Salisb.? |
| D. Tribulus cistoides L. | O. Laguncularia racemosa Gaertn. |
| E. Sesuvium portulacastrum L. | P. Philoxerus vermicularis (L.)R.Br.? |
| F. Cyperus planifolius L.C. Rich. | Q. Salicornia perennis Miller |
| G. Euphorbia mesembrianthemifolia Jacq. | R. Cakile lanceolata (Willd.)Schulz |
| H. Ipomoea stolonifera (Cyr.) Poir.? | S. Atriplex pentandra |
| I. Tournefortia gnaphalodes (L.) R.Br. | (Jacq.) Standl. |
| J. Ambrosia hispida Pursh | T. Portulaca oleracea L. |
| K. Suriana maritima L. | U. Opuntia cf. dillenii |
| L. Cocos nucifera L. (not collected) | V. Ricinus communis L. |
| | W. Casuarina equisetifolia L. |

So far as we know, there are no published records of plants from Arcas.

Jamaica:

A visit to the laboratory of Dr. Tom Goreau, of the University of the West Indies, Kingston, Jamaica, and a few days in the field with him on the Jamaica reefs and those of the Pedro Cays, gave a glimpse of some of the most interesting work now being done on certain phases of reef ecology. Work on the rates of carbonate deposition, and an attempt to get at the nature of this important phenomenon, form the central facet of the investigation. In addition, detailed reef profiles are being recorded by sonar apparatus. By far the most interesting aspect, however, is the opening up of a whole new reef biotope, in the deeper parts of the euphotic zone, down over the edge of the reef front and in the caverns that extend under the reefs, by means of diving with SCUBA gear. New organisms and new concepts of the distribution and abundance of many whole groups of marine animals and plants are resulting from this detailed examination, collecting, and photographing in a region only barely known previously from bits brought up by dredges. The first of a projected series of papers on this work appeared in Ecology 40: 67-90, 1959. In the work on the Pedro Cays, we had the help of the staff of the Institute of Jamaica, and especially of its director, Dr. C. Bernard Lewis, who also kindly shared with us his great fund of first-hand information and bibliographic knowledge of the Pedro Bank and Cays. For all this, we are very grateful.

Atolls off British Honduras:

As noted in the last News and Comments (ARB 84, p. 9), David Stoddart had hardly completed a detailed study of the sand cays and atolls off the coast of British Honduras (see ARB 87), when Hurricane Hattie, a storm of formidable intensity, swept across these cays on its way to devastate Belize. With the aid of the Office of Naval Research and the Royal Society, Mr. Stoddart was able to spend three months early in 1962 in British Honduras, restudying these cays, to determine what were the effects of the storm on them. Some of the changes were spectacular. He is

at present writing up his observations and we hope to be able to publish a companion to ARB 87 for comparison. A short account on Catastrophic storm effects on the British Honduras reefs and cays has been published in *Nature* 196(4854): 512-515, 10 November 1962. Mr. Stoddart has published a summary of the reef work of the Cambridge Expedition to British Honduras of 1959-60 in the general report of this expedition (Thorpe, J.E. and Stoddart, D.R., *Geogr. Jour.* 128: 158-173, 1962).

Dry Tortugas Keys:

A brief visit to the Dry Tortugas Keys, Fort Jefferson National Monument, in company with Bill Robertson, biologist of the Everglades National Park, resulted in a collection of the plants of the atoll and the realization that, in spite of the great amount of disturbance during more than 100 years of human occupation, there is much of interest to be learned there. Mr. Robertson has been observing the birds on his occasional visits; he has added significantly to Sprunt's list (A. Sprunt, Jr., A list of the birds of the Dry Tortugas, reprinted from the *Florida Naturalist* by the Florida Audubon Society, 1-27, 1951, with addenda); he is also keeping records of habits and behavior of birds, especially of the terns (see *Auk* 78: 423-425, 1961). He has collected specimens of the plants and observations on the vegetation and has promised a paper on Tortugas botany for the *Bulletin*. The National Park Service is to be commended for sponsoring this research; we also wish to thank the Service for making it possible to visit this American atoll.

Dr. H. K. Brooks, of the University of Florida, has carried out some studies of the bottom and reefs on the platform surrounding the Tortugas Keys, as well as taking some excellent under-water movies. He plans to continue these studies. It may be pointed out that this is a strategic place to study certain reef phenomena, as it is very near the temperature limits for active reef coral growth. Brooks has also started investigating the submerged reefs south of Appalachicola and west of Tampa, which are possibly just outside the present limits of reef growth.

Florida:

Other significant work on Florida reefs, of value for comparison with reefs and atolls in other regions of the world, is being carried out by Eugene Shinn. His beautifully illustrated report on Spur and groove formation on the Florida Reef Tract will appear in the *Jour. of Sedimentology*.

Recent Books

Atoll Environment and Ecology, by Herold J. Wiens:

Yale University Press, New Haven and London, 1962. 532 pp., 93 figures (including maps), 88 photographic plates, 407 references. \$15. Reviewed by R. E. Warner, Berkeley, Calif.

With the Pacific Basin as his battlefield, author Wiens attacks the multifarious subject of atolls: their formations, physiographies, biotas, ecologies; and ends with a brief thrust at the human ecology of Pacific

Islands. The attack is vigorous, and broadly comprehensive. Writing for a wide range of readers, the author attempts to provide a "useful reference book for students and for administrators and naval personnel in the Pacific Islands"(p. xx).

It very quickly becomes apparent that the treatment is canalized; the perspective of the geographer being continually present. This indeed should not be unexpected, for Dr. Wiens is a capable geographer who candidly states in his preface, "within the framework of the purpose defined, I have included what I felt I would want to know were I newly assigned to live and work on or to study and enjoy the coral atolls"(p. xxi). Hence the treatment, with a few notable exceptions, is a broad overview; intriguing when dealing with subjects new to the reader, intensely frustrating when areas of special interest are cursorily examined then summarily dismissed from further consideration.

The physical, geological and climatological characteristics of atolls are explored in considerable detail, the first eight chapters (227 of 466 pages) being devoted to topics ranging from "Atoll shape" to "Theorizing on atoll origins." The preponderance of data seems to come from the Northern Marshall Islands, and regrettably little space is devoted to areas such as the leeward portion of the Hawaiian chain, where considerable scientific activity has been centered in recent years. Especially provocative are sections of Chapter 4, "The evolution of coral atolls: evidence and theory." Recent evidence obtained through drilling, seismographic and sonographic studies is providing progressively firmer ground for theoretical considerations of atoll formation. Shallow-water coral and calcareous algal deposits have been found to rest on basalt at a depth of 4,222 and 4,610 feet in two drill holes at Eniwetok. At Bikini the coral-basalt interphase was found at 2,556 feet (p. 92). The distribution and geological characteristics of guyots, those enigmatic flat-topped submarine mountains whose origin is still speculative, provide much food for thought, especially for the biogeographer. On p. 89 (fig. 38) a perspective view of the Pacific Basin in the Eniwetok-Rongerik area, taken from Von Arx's 1954 paper, clearly depicts a panorama of truncated high islands, now submerged to varying depths by isostatic adjustment, rise of sea level, and/or other unknown means. Nevertheless the author, perhaps wisely, refrains from drawing his own conclusions on this complex subject, ending his discussion with quotations from several relevant papers to the effect that "probably no single reef theory will explain all reefs."

Chapters 5 through 8 are devoted primarily to hydrological and climatological influences. The discussion ranges from "Sea-level changes" to "Typhoon frequency" and again is less an analysis than a general review of kinds of phenomena impinging on and contributing to the atoll environment. Statements relative to sea level changes, wherein the author leans heavily on the conclusions of Fairbridge (see pp. 107 and 134) are premature. The author, for instance, favors the view that as recently as 3,600 years ago a 10-foot-higher sea level probably submerged most present-day atoll land surfaces. This is not in accord with the degree of endemism found in the extant terrestrial biota of several low islands. Laysan Island, for example, would in all likelihood have been completely inundated by the proposed 10-foot rise in sea level. Yet the number of endemic

plants (7 of 26) and land birds (5 of 5) recorded in historic times strongly suggests a considerably longer period of emergence. At best, evidence for the 10-foot rise is tenuous.

The latter portion of the book is addressed to the biology of atolls. The treatment of each subject (e.g. Marine fauna dangerous to man, pp. 282-295; Atoll terrestrial fauna, pp. 404-449) is cursory. The beginning student will find it intriguing; the specialist, frustrating. Much available material has been neglected. Indeed, in some areas, important recent studies have been entirely omitted. In general the literature reviewed is restricted to animal-man and plant-man interactions. While this may be in keeping with the author's general goal, the student of atoll ecology will be disappointed in his search for fresh insights. It is in this latter portion of the book that the overextension in scope becomes most apparent. The "... dissection of the landscape and the physical and biological complex of the coral atoll in its tropical realm..." (p. xx), so heroically attempted, from the outset commits the author to the damnation of incompleteness. For the subject of atoll environment and ecology is too diverse, too ill-understood, and too widely scattered through the scientific literature to permit concise elucidation.

The administrator, the beginning student of Pacific Basin ecology, and the educated layman will find Atoll environment and ecology richly rewarding and full of new vistas of the Pacific world. The advanced student and the Pacific Basin specialist will be disturbed and often exasperated by its superficiality, its rather peculiar format, and the canalized treatment of subject areas; but should nevertheless find it a useful, if controversial, reference.

Bates, Marston, and Abbott, D. P., Ifaluk:

290 pp., Museum Press Ltd., 1960. We have not seen this book, but are told that it is slightly different from the authors' Coral Island (1958), and that the illustrations include some in color.

Ellice Islands:

It is good to see that old-fashioned ethnology, with its emphasis on material culture, has not been entirely supplanted by the more fashionable "functional" sort, that scarcely seems distinguishable from sociology except that it deals with less industrial societies. We have just received a copy of Die materielle Kultur der Ellice-Inseln, by Dr. Gerd Koch, 199 pp., published by the Museum für Völkerkunde, Berlin, 1961, which is a detailed and abundantly illustrated description of the things used by the Ellice Islanders in their everyday life. In addition to text on how each item is made, of what, how it is used, and what it is called, the author has presented careful drawings of most or all items. The work is based on nine months field work in the Ellice group in 1960-1961, and a study of available museum material. The drawings are supplemented by 23 plates of beautiful photos. We are not able to assess the technical details of this work, but it is safe to say that a study of this sort is greatly

to be desired for every island culture in the Pacific. The author has informed us that he will work in the Gilberts in 1963-1964. We hope he will have abundant support to continue this type of work indefinitely.

Maldives:

Unquestionably the most effective motivation for scientific research is a combination of a strong intellectual curiosity, a sense of wonder, and a keen appreciation of beauty. That Dr. Hans Hass is well endowed with all of these faculties is abundantly shown by his magnificently illustrated book on his last expedition, *Expedition ins Unbekannte*, published in Berlin, Frankfurt and Vienna in 1961. The expedition to the Maldivian and Nicobar islands in the research vessel *Xarifa* (see ARB 70) concentrated on investigation of coral reefs and their fauna, and a number of scientific papers have been published on the results. The present book gives an account of the expedition itself, with much interesting information on the islands, the reefs, and their inhabitants, and a wealth of photographs, some in color. Also, there is a chapter outlining a new theory of coral reef formation, formulated by Dr. Hass, an English version of which is presented elsewhere in this issue. Included also (pp. 158-160) is a bibliography of the scientific publications resulting from the several *Xarifa* expeditions. Reading a book of this sort is the next best thing to participating in an expedition. We are eagerly awaiting the promised English translation so we can read it with less effort and enjoy it in comfortable laziness.

Indian Ocean:

"A partial bibliography of the Indian Ocean," compiled by A. E. Yentsch, has been published by Woods Hole Oceanographic Institution, financed by the National Science Foundation. This seems to be principally a compilation from other bibliographies rather than from the original literature, with the citations checked for accuracy if the original papers are in the library of the Marine Biological Laboratory at Woods Hole. It is a completely unannotated list, arranged by subject. The basis for selecting the subject categories as well as the papers to be listed in these categories is nowhere clarified, though there is little attention to anything above the intertidal zone except the weather. Botany is notably absent, except for references on phytoplankton and a section on macroscopic algae. Vertebrates are included, but there are no references on either birds or amphibians. Geography is not indicated either by cross-indexing or by any sectional arrangement. In the Biology section and its subdivisions, however, locations are indicated by headings at the right hand margin. The only index is to authors.

The section on Coral Reefs (Geology and Biology) and certain of the biology subdivisions will be useful to ARB readers, but they should keep in mind that the "partial" in the title is to be taken literally.

How the work may be procured and what is the price are nowhere indicated.

Matters of general interest

Polynesia:

Dr. Harald A. Rehder, of the U. S. National Museum is undertaking a survey of the marine mollusks of Polynesia, using this term in a biogeographical sense to include the triangular area the three points of which lie at Palmyra Island, the Cook Islands, and Easter Island. The major portion of the fieldwork for this study, which is largely supported by a grant from the National Science Foundation to the Smithsonian Institution, will be conducted on two trips in 1963, one early in the year, and the other during the summer and early fall.

The greater part of the time will be spent in making detailed studies and collections on various typical sections of reef and coastline on the following islands and atolls: Tahiti (Pare district) and Maupiti in the Society Islands, Vahitahi and Mangareva in the Tuamotus, Pitcairn, Henderson, and Ducie in the Pitcairn group, Hiva Oa and Nuku Hiva in the Marquesas, Raivavae and Rapa in the Austral group, Mangaia in the Southern Cook Islands, and Palmerston and Penrhyn in the Northern group of the Cooks.

These studies and collections will supplement those made in 1957 by Dr. Rehder on the principal islands of the Society group, and on Tikahau and Makatea in the Tuamotus, as well as by Dr. J.P.E. Morrison during a survey of Raroia Atoll in 1952, sponsored by the Pacific Science Board. In addition, all possible use will be made in the preparation of the report of collections from this area that can be located in other institutions or in private hands. It is hoped that a report can be presented that will give marine zoologists and biogeographers a clearer picture of the composition of the molluscan fauna of Polynesia, its relationship to the faunas of adjacent areas, and clues to its origin and past history.

Some field work will be carried out also on the non-marine faunas of Tahiti (Fautaua Valley), Maupiti, and Mangaia. From these collections it is hoped to determine what changes, if any, have occurred in the composition of the terrestrial snail fauna, comparing the present fauna with that given in the accounts of former collectors, such as Andrew Garrett, A. G. Mayor, and H. G. Crampton.

Mopelia:

Professor A. Guilcher, of the Institut de Géographie, University of Paris, is preparing a trip to Mopelia atoll, Society Islands, to study sedimentology, reef morphology and lagoon water, and has promised a note for a later issue of ARB, when the plans for this expedition are more advanced.

Cahiers du Pacifique:

No. 4 (June 1962) of this interesting journal has just been received. It includes an article on the crabs of French Polynesia, with a table of distribution of 186 species in 24 regions of the world, mostly tropical.

There is also an important news section, including references to recent reports, a section on the recommendations of the 10th Pacific Science Congress (Honolulu, 1961), information on recent conferences and expeditions, and a bibliography of recent papers on Pacific molluscs.

Rangiroa:

The coconut experiment station of the IRHO (Institut de Recherches pour les Huiles et Oléagineux) has been established and a small research program started. The Annual Report of IRHO for 1960 includes a note to this effect (p. 26) and a table of rainfall on Rangiroa Atoll, Tuamotus, the seat of the station.

Micronesia:

The Micronesian Reporter, a bi-monthly publication of the Headquarters of the Trust Territory of the Pacific Islands, reminds us, in the issue just received (vol. 10, no. 3, May-June 1962) that the Headquarters have recently been moved from Guam to Saipan. This issue includes the usual news and information, and an interesting article on Marshallese navigation.

Ellice Islands moving pictures:

A catalogue of scientific films has just been received from the Institut für wissenschaftlichen Film, Göttingen. It includes 13 movies made in the Ellice Islands by Dr. Gerd Koch (see also p. 14 of this ARB), on material culture (building a house, a canoe), dances, etc. For each movie, there is a booklet written by Dr. Koch, with illustrations and bibliography, introducing and describing the film.

Indian Ocean Expedition:

We fondly hoped that a modern investigation of the land and shore ecology of the Indian Ocean atolls could be undertaken in connection with the U. S. Biological Program of the International Indian Ocean Expedition, at least utilizing the ships for inter-island transportation and logistics. Encouraged to think this was possible, we expended serious efforts and much time into planning such an operation. Finally we were informed that there was no room on the vessels for any but oceanographers. Dr. D. D. Keck, of the National Science Foundation, sponsor of the Program, contributed the following announcement of the plans for the Biological Program:

"American biologists will participate in the International Indian Ocean Expedition by taking part in nine scheduled cruises of the Anton Bruun under the general supervision of the Woods Hole Oceanographic Institution, and on three cruises of the Te Vega, the biological vessel of the Hopkins Marine Station, Pacific Grove, California.

"The Anton Bruun is to accomodate the needs of 134 biologists, including 20 foreign scientists from 12 countries. Scientists have been selected by a panel on the basis of merit and the compatibility of their research programs with the opportunities that could be made for them. The ship's schedules are designed for wide coverage to get as much use as possible out of an expensive vessel. Consequently, it is not feasible to put shore parties on atolls and return a number of weeks later to take them off.

"The Te Vega will concentrate chiefly on island work. The scheduled cruises are now essentially subscribed. In connection with the Anton Bruun program, as many of the inshore scientists as possible are to be accomodated at Mandapam Camp, India, and Nosy Bé, Madagascar."

Reef Terminology Index:

The first circular inviting comment on and cooperation with a proposed index of reef terminology with definitions and usages was sent out in late 1956, although the idea was formulated much earlier. The response seemed enthusiastic and cooperation was promised by many people. The Office of Naval Research, on the basis of this, made a grant to support the clerical work and a small amount of compilation of the less obvious parts of reef literature. It was hoped that within two years or so a first draft of the proposed index could be duplicated and circulated for comment. As things turned out, most of the promised cooperation did not materialize and several extensions of the period of the grant had to be requested. After five years it became obvious that this task could not be accomplished by volunteer help, so it was decided to use what remained of the grant to employ someone to do as much more compilation as possible, then to issue the results to date, even though incomplete. We were fortunate to find a graduate student in geology, Mrs. Mary Simon, who was interested in doing this, and who has been working during the past year on the project. It is necessary to close the compilation at the end of 1962 and to proceed at once with the editing and duplication of the several thousand definitions that have been extracted. It is hoped to issue this as a number of the Atoll Research Bulletin early in 1963. Any published definitions that any of our readers care to send in before the beginning of 1963 should be typed on 5 x 8 inch slips with exact references and sent either to the ARB editors or to Prof. Rhodes Fairbridge at Columbia University, New York, 27, N. Y.

Association for Tropical Biology:

At the Conference on Neotropical Botany, held at the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, an Association for Tropical Biology was founded. Its aims are:

- (a) to stimulate, encourage and support research in tropical biology;
- (b) to promote the training and interchange of students, teachers and investigators in this field;
- (c) the development of facilities to attain these objects.

Membership in the new Association is open to all those who are interested in tropical biology. The membership fee of \$ 1 U. S. or its equivalent should be paid to Professor J. W. Purseglove, Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies. Members who join before December 31 1962 will be regarded as Founder Members of the Association.