ATOLL RESEARCH BULLETIN

NO. 185

ISLAND NEWS AND COMMENT

Issued by
THE SMITHSONIAN INSTITUTION
Washington, D.C., U.S.A.

January 15, 1975

ISLAND NEWS AND COMMENT

In order not to delay further an already very tardy issue of ARB, the present News and Comment number will be restricted to a few already prepared items. We have much in the way of news and bibliographic information on hand, but the time is not readily available for editing it. Hence we will include most such items in the next Island News and Comment number. We apologize for this to those who have sent us news items, bibliography, or comments.

We have received some very poorly prepared articles during the past several years. Our stated policy has always been to take no editorial responsibility for rewriting, and to return such material to its authors. On occasion we have carried out this policy, but frequently, if rather little work was required, if the material was of sufficient interest that we did not want to risk discouraging the author and losing it, or if the author's own language was not English, we have done the necessary editing or rewriting. We have found that some authors, even when rewriting their articles, cannot seem to produce a presentable or clear document, and we have then rewritten the second attempt. We have taken the time to do this not for the benefit of the authors, but for that of our readers. Now we have come to the point that we cannot afford to do extensive editing, and must adhere much more strictly to our policy, and return material that needs much editorial attention. This not only will relieve our time problem somewhat but may result in more prompt publication of the well-written papers that we receive. We would suggest, to avoid any return of manuscripts, that every author get a critical review from a colleague who can write clear English and understands the subject matter before submitting his paper to us. This may help avoid wounded pride and hurt feelings, as well as facilitating and speeding up publication of ARB.

We very much appreciate the contributions to our ARB fund from those of you who have sent them in for this year without our reminding you. We hope to have enough issues out this year to justify your confidence. Contributions from others will be appreciated.

NEWS

SOUTH PACIFIC CORAL REEF STUDIES: On the occasion of the International Symposium on Oceanography of the South Pacific, sponsored by UNESCO and held in Wellington, New Zealand, during February 1972, a Special Working Committee on South Pacific Coral Reefs was formed and recommendations for future research activities and exchange of information within the South Pacific were forwarded to UNESCO as detailed in Cahiers du Pacifique 16: 224-228, 1972. This Committee met again during the Second International Symposium on Coral Reefs held along the Great Barrier Reef aboard the cruise ship "Marco Polo" in June 1973.

It was decided that a small international meeting of coral reef workers should be held at a suitable location in the Pacific during 1975 about the time of the Pacific Science Congress. A grant will be sought for this meeting from UNESCO's Participation Programme initiated through the New Zealand National Commission for UNESCO. It is also considered relevant to certain national contributions to the Man and the Biosphere programme.

In anticipation of this meeting, review papers detailing the state of knowledge, problems and prospects, and future plans, supplemented where appropriate with a bibliography of previously published literature, will be solicited from workers in various taxonomic groups, and stressing, wherever possible, biogeographic and ecological aspects. This compilation, which is intended to be published in permanent form, would be prefaced with an account of the exploration and investigation of coral reefs of the region which is taken to include all the islands east of the Great Barrier Reef from the Solomons to Henderson and Ducie and from the Gilbert Islands south to the Kermadec Islands in the New Zealand Region. Track charts of expeditions and chronological tables of research programmes as in French Polynesia would also be included.

Those who are being asked to prepare such papers would also be expected to present and discuss them at this meeting which will be limited to about 35 participants. It is planned to hold the meeting over a period of a week or ten days and the other propositions mainly concerning exchange of information, financing of expeditions and common problems may be discussed in more detail.

The Special Working Committee on South Pacific Coral Reefs consists of the following:

E. W. Dawson, Senior Biologist, New Zealand Oceanographic Institute, Wellington, New Zealand (CHAIRMAN).
M. Angot, Regional Expert in Marine Sciences for UNESCO, Djakarta, Indonesia.
P. J. Beveridge, School of Biological Sciences, University of the South Pacific, Suva, Fiji.
F. Doumenge, School of Biological Sciences, University of the South Pacific, Suva, Fiji.
D. S. Devaney, Invertebrate Zoologist, Bernice P. Bishop Museum, Honolulu, Hawaii.
J. E. Morton, Professor of Zoology, University of Auckland, New Zealand.
H. A. Rehder, Malacologist, National Museum of Natural History, Smithsonian Institution, Washington, D.C.
B. Salvat, Directeur aux Hautes Etudes, Ecole Pratique des Hautes Etudes, 55, Rue de Buffon, Paris.
D. R. Stoddart, Department of Geography, University of Cambridge, England (Chairman of Committee for International Symposia on Corals and Coral Reefs).

PACIFIC SEABIRD GROUP AND BULLETIN: We are glad to announce the formation of the Pacific Seabird Group and the appearance, January 1974, of volume 1 number 1 of its Bulletin. The Group is composed of, and open to, "persons known to have an interest in Pacific seabirds." It will provide coordination and stimulation of the field activities of its members rather than initiating any field activities of its own."

Judging by the contents of the first number of its Bulletin, a very important goal, also, is the promotion and encouragement of conservation activities concerning seabirds. Listed, also, are specific research projects on Pacific Seabirds. The membership list, of 162, among them some familiar names, is also in the Bulletin. Further information as to the contents of the Bulletin and the activities may best be obtained by joining the Group. Correspondence should be addressed to: Secretary, Pacific Seabird Group, 1412 Airport Way, Fairbanks, Alaska 99701.

ATOLL POPULATIONS CONFERENCE, HAWAII, DECEMBER 1972: A conference on Pacific Atoll Populations was held at the East-West Center, Honolulu, Hawaii at the end of December, 1972. Sponsored by the East-West Population Institute, and organised by Dr. Vern Carroll of the University of Michigan, the conference brought together some two dozen anthropologists, demographers and geographers for four days of formal discussion on the comparative and historical demography and the changing social and cultural antecedents of atoll populations in the Pacific.

The conference was convened as a workshop for the authors who are contributing to a forthcoming volume in the Association of Social Anthropologists in Oceania (ASAO) Monograph series, entitled "Oceanic Atoll Populations" (Vern Carroll, editor, University of Hawaii Press). In preparation for the Hawaii meeting, during 1972 monographic studies of selected atoll populations were prepared by the participants, using census and other ethnographic data previously collected during fieldwork. These papers were circulated before the conference to the fourteen participating Ethnographers and to the eight Session Chairmen and Discussants. Suggestions and queries were exchanged both before and during the conference, at which decisions were made concerning the standardized presentation of demographic and supporting data, in order to ensure the maximum degree of comparability between different atoll studies. Revised versions of the papers together with concluding chapters written by some of the Session Chairmen will be submitted for the ASAO Monograph, which was to be in press by mid-1973.

The atolls covered by the participant Ethnographers were as follows:

Central Carolines
Lamotrek-Woleai .... William Alkire (Victoria, B.C.)

Mortlock Islands
Etal .... James Nason (Washington)
Namoluk .... Mac Marshall (Iowa)

Marshall Islands
Namu .... Nancy Pollock (Victoria U, Wellington)
Arno .... Michael Rynkiewich (MacAlester)

Gilbert Islands
Makin .... Bernd Lambert (Cornell)

Ellice-Tokelau Islands
- Ellice Group .... Ivan Brady (Cincinnati)
- Tokelau Group .... Antony Hooper (Auckland) and Judith Huntsman (Auckland)

Tuamotus
- Pukurua .... Sachiko Hatanaka (E-W Culture Learning Inst.)
- Rangiroa .... Paul Ottino (Tananarive, Madagascar)

Polynesian Outliers
- Nukuoro .... Vern Carroll (E-W Population Inst. and Michigan)
- Ontong Java and other atolls north of the Solomon Islands ...... Tim Bayliss-Smith (Geography, Cambridge)
- Outer Reef Islands .... William Davenport (Philadelphia)

During the conference, informal papers were presented as bases for discussion by the Session Chairmen and Discussants, on the following topics:

- The Definition of atoll populations .... Vern Carroll
- Demographic analysis and small populations .... Griffith Feeney (E-W Population Inst.)
- Data requirements for comparative analyses .... Ko Groenewegen (South Pacific Commission)
- Computer techniques .... Michael Levin (E-W Population Inst. and Michigan)
- Changing patterns of mortality and morbidity, fertility, and migration .... Peter Pirie (E-W Population Inst.)
- Role of inbreeding in fertility reduction .... Newton Morton (Population Genetics Lab., U. Hawaii)
- Biological-ecological-cultural antecedents to population change and normative cultural outputs .... Alan Howard (E-W Population Inst.), Aram Yemgoyan (Michigan) and Robert Harrison (Wisconsin)

In addition to these conference participants, there were also a number of observers including members of the staff and students of the East-West Center, the University of Hawaii, and the Bishop Museum.

Most people attending the conference felt that it was particularly successful in encouraging the mutual interchange of ideas between the anthropologists and the demographers, whose respective viewpoints did not always coincide. It soon became obvious, however, that the two disciplines had much to offer to each other, and that for both of them atoll populations provide distinct advantages for in-depth research. Not only is the atoll environment relatively uniform in the Pacific so that comparative studies become particularly meaningful, but also their human populations are normally sufficiently small and discrete to enable a rich array of data to be collected. For the anthropologist, it becomes possible to obtain census information not only for the total living population, resident and migrant, but also, by means of genealogies, for the recently deceased. From these data, unusually detailed studies can be made of the changing patterns of fertility and mortality. Similarly, atolls provide favourable conditions for the measurement and study of migration, which is becoming for many Pacific islands an increasingly dominant demographic process. Several of the conference ethnographers are collaborating with Michael Levin of the University of Michigan in a computer project, using genealogical and census data from complete atoll populations. Computerized techniques should enable detailed, quantitative analyses to be carried out on a cross-cultural basis, in a way not yet attempted in either discipline.

The Atoll Populations Conference and the publication arising from it could therefore do much to encourage what has been a relatively neglected genre of oceanic research. There is a pressing need to advance our understanding of demographic processes at the village level, especially in the Pacific where the threat of overpopulation is in places so urgent. More pragmatically, for some territories there is also considerable room for improvement in the accuracy and usefulness of official published census data. If the volume "Oceanic Atoll Populations" were merely to point out the current deficiencies in fields such as these, it would serve a useful purpose. Hopefully, it will also achieve a good deal more.

Tim Bayliss-Smith,
Department of Geography,
University of Cambridge,
Cambridge, England.

DEATHS: We are saddened to have to report the death, in April, 1974 of our old friend Professor Marston Bates, who participated in the Pacific Science Board expedition to Ifaluk Atoll, Carolines, in 1953, and was co-author with Don Abbott of Coral Island, 1958.

Professor David Lack, of Galapagos bird population and evolution studies fame, died on March 12, 1973. Island research lost an important participant.

We wish to express our sympathy to Dora and Hank Banner for the loss, in a shark attach in Samoa, of their son, Alan Conrad Banner, a promising young marine biologist interested in islands.

SHORT PAPERS

MARINE ALGAE OF GREAT SWAN ISLAND

by Wm. Randolph Taylor
Department of Botany and Herbarium,
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Ann Arbor, Mich., 48104

In the Spring of 1972 I received by the courtesy of Director C. Bernard Lewis of the Science Museum, Institute of Jamaica, Kingston, of the curator of algae, Mrs. Lena Green, and of the collector, Dr. George R. Proctor, a substantial number of algal samples from Great Swan Island. To all of these persons I am much indebted for the pleasure of receiving and reporting on this material, much of which had been identified by Mrs. Green before it came to me. Study of this collection was in part supported by Grant GB-3186 from the National Science Foundation, such help being gratefully acknowledged. The algae were collected between the 15th and 24th of August, 1971, and are distinguished by the Institute's accession numbers. The first set of specimens is in the Science Museum, Kingston, and a partial one at the University of Michigan.

The Swan Island group lies at approximately 17° 21' N Lat., 83° 56' W Long., about 180 km. n.n.e. of Punta Patuca, Honduras. It was at one time called the Islas Santamilla, later the Islas del Cisne, and now as United States of America territory, the Swan Islands.

Dr. Proctor kindly supplied useful information about the little islands of the group, of whose underwater vegetation we have not hitherto had any information. Great Swan Island, the one with which we are concerned, is of the order of 3 km in length and about a third as broad, lying at an angle a bit south of west to north of east. It is relatively flat, a hard limestone cover over an igneous base which is somewhat exposed locally, particularly along the south shore, and much of the shoreline is bordered by cliffs 6.5-13 meters high. The available chart shows an uneven bottom around the west end, quite shallow, but this rather open bay is the usual landing place.

Collections were made in 4 of the 5 bay areas. Booby Islet lies just off Buffalo Point, and the largest collection was made on the shoal between them, about 30 species excluding microscopic forms. None of the other collections were half so large. Smith Bay, next on the south shore, appears by the chart to be rock-obstructed, which would not inhibit algae; it had the next most varied flora. Jim Duff Hole or Goat Bay appears not to have been examined. Jacobsons Bay on the northeast is widely exposed. Fowlers Bay on the north is about as deep as broad, open, but lies just east of an area of heavy breakers, of which the chart gives warning. No doubt considerable additional data could be had by diving, but faced by long stretches of cliff and in the apparent absence of a fringing reef, the island offers little attraction to an underwater botanist.

The four areas contributed to the collection, and all the algae were collected in shallow water. No more habitat information accompanied them. Much the longest list came from what seems to have been an accessible traverse, namely from Buffalo Point to Booby Cay, which apparently lies close offshore. About half as many came from Fowlers Bay and from Smith Bay, but least from Jacobsons Bay. Segregating the specimens from each area developed no very distinctive ecological grouping to show very much habitat difference. In all cases there were algae from a sandy bottom, be it only local patches, such as Penicillus, Rhipocephalus or Udotea, and plants from reef rock or scattered coral fragments, such as Stypopodium, Dictyota or Padina. The Caulerpas could have been on reef rock or merely attached to bits of coral or shell over the bottom, the Janias were epiphytic on larger algae limited to a firm substrate. Nothing suggested that areas exposed to severe surf were studied, or that hot muddy shallows were involved. The phytogeographic relationship is clearly to the flora of the northern Caribbean (Taylor 1960) as would be expected. In fact the same is true of Isla da Providencia about 520 km to the southeast (Taylor 1939, p.1).

LIST OF ALGAE COLLECTED

Species are listed in the order entered in Taylor 1960.

Chlorophyceae

Chaetomorpha linum (Mull.) Kütz. Smith Bay, no. A.6746.

Cladophora fuliginosa Kütz. Fowlers Bay, no. A.6684.

Valonia ventricosa J. Ag. Shoals, Buffalo Point to Booby Cay (hereafter simply listed as Buffalo Point), no. A.6733.

Dictyosphaeria cavernosa (Forssk.) Børg. Buffalo Point, no. A.6734.

Caulerpa cupressoides (West) C. Ag., var. mamillosa (Mont.) Weber-van Bosse. Buffalo Point, no. A.6732; Jacobsons Bay, no. A.6680.

Caulerpa racemosa (Forssk.) J. Ag., var racemosa. Smith Bay, no. A.6703.

Caulerpa racemosa var. uvifera (Turn.) Weber-van Bosse. Buffalo Point, no. A.6735.

Udotea flabellum (Soland.) Lamx. Buffalo Point, no. A.6728; Jacobsons Bay, no. A.6681.

Penicillus capitatus Lamk. Buffalo Point, no. 6730; Jacobsons Bay, no. A.6674; Fowlers Bay, A.6683 p.p. maj.

Penicillus lamourouxii Dec. Buffalo Point, no. A.6727; Fowlers Bay, no. A.6683 p.p. min.

Rhipocephalus phoenix (Soland.) Kütz., var. phoenix. Buffalo Point, no. A.6726; Jacobsons Bay, no. A.6676.

Rhipocephalus phoenix var. brevifolius A. & E. S. Gepp. Smith Bay, no. A.6708.

Halimeda opuntia (L.) Lamx. Buffalo Point, no. A.6739; Smith Bay, no. A.6695.

Halimeda tuna (Soland.) Lamx., var. tuna. Buffalo Point, no. A.6738.

Halimeda tuna var. platydisca (Dec.) Bart. Smith Bay, no. A.6701.

Halimeda simulans Howe. Smith Bay, no. A.6696.

Halimeda incrassata (Ell.) Lamx., var. incrassata. Jacobsons Bay, no. A.6682.

Halimeda incrassata var. ? gracilis Børg. Buffalo Point, no. A.6731.

Codium intertextum Coll. & Herv. Buffalo Point, no. A.6759.

Codium taylori Silva. Buffalo Point, no. A.6760.

Phaeophyceae

Dilophus guineensis (Kütz.) J. Ag. Buffalo Point, no. A.6753; Fowlers Bay no. A.6747.

Dictyota dichotoma (Huds.) Lamx. Fowlers Bay, no. A.6689.

Dictyota divaricata Lamx. Buffalo Point, no. A.6754; Smith Bay, no. A.6702.

Dictyota dentata Lamx. Buffalo Point, no. A.6723; Fowlers Bay, no. A.6694.

Stypopodium zonale (Lamx.) Papenf. Buffalo Point, no. A.6724.

Padina pavonica (L.) Thivy. Jacobsons Bay, no. A.6677.

Padina vickersiae Hoyt. Buffalo Point, no. A.6720.

Padina sanctae-crucis Børg. Buffalo Point, no. A.6721.

Sargassum ?polyceratium Mont. Fowlers Bay, no. A.6748.

Turbinaria tricostata Bart. Buffalo Point, no. A.6722.

Turbinaria turbinata Kuntze. Fowlers Bay, no. A.6686; Smith Bay, no. A.6699.

Rhodophyceae

Liagora megagyna Børg. Jacobsons Bay, no. A.6749.

Galaxaura subverticillata Kjellm. Buffalo Point, no. A.6715.

Galaxaura squalida Kjellm. Buffalo Point, no. A.6713.

Galaxaura rugosa (Soland.) Lamx. Smith Bay, no. A.6705; Jacobsons Bay, no. A.6673.

Galaxaura oblongata (Soland.) Lamx. Smith Bay, no. A.6704.

Fosliella farinosa (Lamx.) Howe var. farinosa. Buffalo Point, on Valonia, no. A.6733, p.p. min.

Fosliella farinosa var. solmsiana (Falk.) Taylor. Buffalo Point, on Valonia, no. A.6733, p.p. min.

Amphiroa fragilissima (L.) Lamx. Smith Bay, no. A.6707.

Amphiroa rigida Lamour., var. antillana Børg. Jacobsons Bay, no. A.6675.

Corallina cubensis (Mont.) Kütz. Buffalo Point, no. A.6719; Fowlers Bay, no. A.6687, A.6688 p.p. min.

Jania capillacea Harv. Fowlers Bay, on Digenia, no. A.6688 p.p. min.

Jania adherens Lamx. Fowlers Bay on Sargassum, no. A.6748 p.p. min; on Digenia, A.6688 p.p. min.

Ceramium brevizonatum H. E. Peters., v. caraibica Peters. & Børg.: Buffalo Point, no. A.6717.

Ceramium nitens (C. Ag.) C. Ag. Smith Bay, no. A.6709.

Spyridia aculeata (Schimp.) Kütz. Fowlers Bay, no. A.6690.

Bryothamnion triquetrum (Gmel.) Howe. Buffalo Point, no. A.6718.

Digenia simplex (Wulf.) C. Ag. Buffalo Point, no. A.6714; Fowlers Bay, no. A.6688.

Herposiphonia secunda (C. Ag.) Ambron. Fowlers Bay, no. A.6691.

Laurencia obtusa (Huds.) Lamx. Fowlers Bay, no. A.6693.

Laurencia intricata Lamx. Smith Bay, no. A.6700.

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PREDATION UPON HATCHLINGS AND EGGS OF THE GREEN TURTLE, CHELONIA MYDAS, ON ALDABRA ATOLL, INDIAN OCEAN

by C. B. Frith

Field observations of predation upon natural turtle hatchings are very rare (Frazier 1971); the author's observations, therefore, are recorded here. He was on Aldabra (latitude 9°24'S, longitude 46°20'E) for the period April 1972-April 1973 as a member of The Royal Society Research Station staff. I refer interested readers to the map and place names published by Stoddart (1971). Observations are headed under predator type.

Crabs

A. Dr. Dawn D. Alexander wrote the following in her field notes: "During early evening on 6 March 1972 a number of Green Turtle hatchlings, Chelonia mydas, were observed making their way to the sea edge at Dune Jean-Louis, South Island, where they met a line of hundreds of crabs, Ocypode ceratophthalmus." These crabs were seen to attack, kill, and carry off several hatchlings. A single crab of the same species was found in its burrow with a torn and dying turtle hatchling. The burrow in this particular case was in the sand of the turtle nest itself. Frazier (1971) records finding Ocypode crabs burrowing into turtle nests.

B. A second observation of predation by the crab O. ceratophthalmus was made by D. Bourn (pers. comm.) at the same locality as above almost exactly a year later: "At 20.00 hours on 4 March 1973 ten or more hatchling Green Turtles were seen making their way to the beach. This was four and a half hours after high tide. Two hatchlings were released from the ghost crabs, O. ceratophthalmus, and another three were seen to be devoured by crabs of the same species."

Fish

On 1st October 1972 a thirty pound specimen of the fish Caranx ignobilis was caught by rod and line off the reef by West Channels. Upon examination it proved to contain the partly digested remains of twenty five hatchling Green Turtles, C. mydas. If these were all caught from a single hatching it would represent over twenty five per cent predation upon an average Aldabran clutch (Frazier) by a single fish.

Birds

A. At 17.55 hours on 11 June 1972 a hatchling Green Turtle was seen erupting from a nest on Anse Malabar beach, Middle Island. This was 107 minutes after high tide and in full sunlight. The first hatchling was directly followed by others until sixty two had emerged from the nest, all breaking surface at exactly the same spot.

Prior to the appearance of the young turtles a number of flightless White-throated Rails, Dryolimnas cuvieri aldabranus, had been observed about the beach area. As soon as these birds spotted the turtles they rushed at them in an excited fashion. The birds were most decisive in their attacks and did all they could to avoid the five people trying to protect the hatchling turtles. Within a few minutes there were five rails. Two birds did catch and kill a turtle each. These were picked up in the bill and carried off a short distance away from the people, and from the other rails. The top of the turtle carapace was pecked open in a neat round hole and the contents eaten through this bit by bit.

As several rotten or unhatched turtle eggs were dug from the nest, rails immediately snatched them up in their bills and ran off with them. These were then pierced and the contents eaten through a small hole. Both the hatchlings and eggs appear to have been instantly recognised as food.

One rail was robbed of its young turtle by a Pied Crow, Corvus albus, the crow flying to a perch where it was joined by another, and eating the turtle whilst holding it to the perch with the feet.

B. Mr. D. Bourn gave the following information in his field notes for 16 March 1973: "At 15.30 hours on the sand dune at Dune Jean-Louis. Twenty to thirty green Turtles were seen erupting from the sand. Ten Turnstones, Arenaria interpres, seven Pied Crows, Corvus albus, and a Sacred Ibis, Threskiornis aethiopica, were observed pecking and killing the young turtles. The birds were mostly picking at the neck of the hatchlings."

Whilst the Sacred Ibis was seen to peck at, and shake, the hatchlings its bill would not be adequate to reduce them in size and it would presumably have to swallow them whole. This was not observed, but considerably larger prey is well known for this species.

Acknowledgements

I am most grateful to Dr. Dawn Alexander and Dr. David Bourn for making their notes available for incorporation here. I am grateful to The Royal Society of London for the opportunity to visit Aldabra and thank the staff of that institution for assistance.

References

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RECONNAISANCE AND PLAT MAPPING OF CORAL ATOLLS: A SIMPLIFIED RANGEFINDER METHOD

by James D. Nason

In a recent issue of the Atoll Research Bulletin there appeared a short paper by S. B. Domm dealing with a one-man technique for the mapping of reefs cays (1971:15-17). The method described by Domm seems particularly useful for reconnaisance mapping over long distances where plant growth does not hamper lines of sight. Since only simple and relatively inexpensive equipment is involved, this was a most welcome addition to the available practicum of field research on coral landforms.[1] As his paper pointed out, available time, equipment costs, and a general absence of aerial photographs either discourage or certainly hamper the production of maps for small Pacific islands. To these one might also add the difficulty of procuring good base maps of many islands, thereby making it necessary to produce field base[2] maps before recording surface features that are of particular interest.

These basic pre-conditions can pose a variety of serious problems for researchers in many fields. This would not seem to be true for those engaged in anthropological research as this will, almost by definition, be carried out on inhabited islands where necessary assistance can be secured. The presence of helpers can save one time and effort and change equipment requirements. This may not always be possible however, and may not be a particular blessing even when assistance can be obtained. Without some training and experience it is at best frustrating to have assistants in attendance while one attempts an investigative procedure, like mapping, which in the end seems primarily designed to entrench one's community position as resident idiot.

Nonetheless it remains the rule rather than the exception that anthropological fieldwork should include the production of site maps of one kind or another. Whether one knows mapping procedures or not, the benefits to be derived from field maps usually out-weigh the trials that they may entail (vide RAI 1954:47, Pelto 1970:230). The utility of maps in anthropological research is particularly great for coral islands of the Pacific, where considerations of atoll geography are critically important data for the understanding of both man-land and man-man relationships (cf. Alkire 1965, Crocombe 1964, TTPI 1958). Thus, the situation in which many anthropologists may find themselves can be summarized as being one where maps should be produced, with or without local assistance, with any one or all of the following conditions making this a most difficult task:

1, 2: All notes are at end of paper.

(1) A fundamental lack of pre-research training or experience in mapping procedures and equipment, with a severe limitation on the amount of pre-field time in which to learn such procedures;

(2) An absence of up-to-date or accurate base maps to use as 'starting points' for island maps;

(3) A general limitation on the amount of fieldwork time available for carrying out map making as a research enterprise, no matter how valuable maps might be for the project;

(4) A lack of research funds available for the purchase of either any map 'gear' or certainly any 'sophisticated' mapping equipment, e.g. telescopic alidade, plane table, transit, etc.

Some of the above factors came into play during my own research on a small coral island in the United States Trust Territory in 1968-69.[3] No base map indicating surface features for the island on which I planned to do research could be located before departure or when once in the field. A United States H.O. chart of the immediate three island area was available (at a scale of 1:72,830) but it quickly became apparent in the field that the island as shown on the chart was much in error and, accordingly, that the chart could not be used. The research funds that had been made available permitted only modest expenditures for mapping equipment. In this instance I secured only a good quality hand compass and a steel tape with other appropriate supplies. Research time in the field was also limited. As a result, while maps of island features were important to the research, island mapping was always in some danger of being omitted due to the press of other vital investigations. Using a compass-pace method, with steel tape checks, the requisite maps eventually required in excess of 230 man-hours to complete. This was with prior experience with my equipment and with mapping procedures, starting from scratch (i.e. preparing my own base maps of this multi-islet atoll of less than one square mile total land area), and with the valuable assistance of two island men.[4] The resultant maps have an estimated error of approximately 5% to 8%. While not accurate enough for any 'legal' survey purpose, they were of sufficient caliber for research of the type in which I was engaged.

The rather large time expenditure involved in the above research mapping is not, apparently, unique for anthropologists working under similar conditions. Leonard Mason, for example, states that his compass-pace map of the islet of Laura (Majuro Island) required some 325 man-hours with the aid of one good assistant (1967:4-5). If at all characteristic, it represents by far too great an outlay of limited and valuable research time. The problems of time, background skills, and equipment or supplies can combine to provide obvious setbacks in this or other research. Certainly, these problems should provide a considerable incentive for the search for an alternative survey technique which would yield accurate results with a minimum of difficulty. Since funding for research is still rather restrictive, there remains a monetary factor to contend with which automatically rules out any very costly equipment. A more satisfactory, if not ideal, mapping system, then, should incorporate minimal cost with equipment and procedures that will permit single person operation which is not only rapid and accurate but simple to learn, given no prior experience. The procedure should involve a minimum of stations and, at best, either no or minimal need to establish stadia or other sighting markers. After considerable thought and some experimentation, I would like to suggest a mapping procedure which seems to best answer this problem, at least given my own goals and requirements.

To my knowledge the only device available which will allow one-station, single person operation is an optical rangefinder. Since these devices depend upon the effects of optical parallax, their accuracy and range of effectiveness depend primarily upon the distance of separation between the two sighting apertures (assuming reasonable quality of mirrors and prisms and other critical components). This immediately introduces the problem of size and portability, since the 'larger' the rangefinder, i.e. the greater the separation between the two apertures, the greater the accuracy of sighted readings. For this reason, these devices have apparently not be usually considered for even rough survey usage. I would like to suggest, however, that there are rangefinders available to us that are well suited for the kinds of uses of interest here. I feel certain that the suggestion that rangefinders be employed for mapping is not original, but I have been unable to learn of prior instances where they have been used.

There are a number of new rangefinder models presently on the market, but I have located one in particular that seems to best meet my own particular requirements. This is the 'Duo-Site Range Height Finder' manufactured by Tokyo Optical Co., Ltd. and sold, in the United States, through the Dietzgen Company. This is a double-image coincident focusing rangefinder that is very portable, has an acceptable accuracy range, and is available at a reasonable cost. The exact specifications as they are given by the manufacturer are as follows:

(a) overall dimensions - 12 in. long, 1.75 in. thick, 4 in. wide
(b) aperture separation - 9.8 in.
(c) weight - 1.25 lbs.
(d) magnification - 3X
(e) distance range - 17 ft to 1000 ft (scale intervals of less than 50 ft up to 400 ft)
(f) listed retail price - $64.50 US

Since the types of maps I am interested in producing involve the mapping of a number of land areas of less than two acres each, the listed error range for this rangefinder and the scale intervals are both acceptable. Expectable errors, for instance, are less than 1% at 60 ft, approximately 2% at 165 ft, and approximately 4% at 330 ft. A simple one-screw adjustment is provided for correcting the distance scale after transit or during operation. In addition, the instrument's metal case is covered with a textured, waterproof vinyl material to inhibit rusting and other forms of similar wear (the entire instrument can be waterproofed by the dealers to enhance tropical use). Finally, this rangefinder is equipped with a height gauge in the form of a semi-circular plate with attached pendulum arm. The pendulum arm is scaled for readings of oblique distances. The plate carries a grid scale for both vertical height and horizontal distance, with the periphery of the plate marked left and right up to 70° incline or decline (see fig. 1). Slope angles are taken by means of sights through an objective sight and aperture sight which are mounted on the distal ends of the top surface of the rangefinder. A pendulum stop is released to allow the pendulum arm to swing freely until it stops at the proper position on the plate. The four factors of slope angle, instrument height, oblique distance, and horizontal distance can then be variously utilized to determine:

(a) vertical height - given oblique distance, horizontal distance, and instrument height

(b) " " - given oblique distance, slope angle, and instrument height

(c) horizontal distance - given vertical height, oblique distance, and instrument height

(d) " " - given oblique distance, slope angle, and instrument height

The maximum vertical range (as shown on the pendulum arm) is 150 feet. This can be increased by using the slope angle with the horizontal distance, which is factored by some divisible integral number which is then used as the multiplier for the reduced vertical height reading obtained on the scale at that shorter horizontal distance. The manufacturer's listed accuracy ranges for vertical readings are 2% at 66 feet and approximately 4% at 130 feet.

This instrument, as is, would have to be used in conjunction with a compass and recording notebook as the minimum equipment necessary for field map production. Handling the rangefinder, compass, and book for each sight, however, seems in some respects a time-consuming procedure that might very well not warrant the added luxury of the rangefinder at all. The user, of course, would still find it necessary to translate his field notes into a workable map. To make the use of this instrument somewhat more direct and simple, therefore, I have added a 'stand' for the rangefinder and, in essence, a plane table (see fig. 2). The stand I am employing consists of a 4 by 12 in. base plate of 1/2 in. clear plexiglas with 1/8 by 1 in. aluminum bars supporting two 1/2 in. plexiglas holding brackets. The stand is assembled with 1/4 in. flat head brass bolts and wing nuts, with one through the two-part aluminum support to facilitate movement of the rangefinder at an angle for oblique sights. The base plate has beveled edges to improve reading an attached plastic scale. For my 'plane table' I use a standard, good quality camera tripod and a small (24 by 18 by 3/8 in.) drawing board. The underside of the board has a 1/4 in. wood plate (3 by 4 in.) glued at the center. At the center of the plate a hexagonal head nut of the same size as the tripod plate screw has been inset and securely glued.

Used in this manner, the rangefinder is essentially a specialized type of telescopic alidade with all of the latter's advantages, e.g. on-site production of a map, but without the requirement of complementary use of a stadia rod and two-man operation. The above arrangement has proved to be not only stable (at least in winds up to 30 mph) but also amenable to the rapid production of both reconnaissance and plat maps. The procedures for use are relatively simple. Once the 'plane table' is situated and the mapping paper (or drafting film) applied, a compass bearing marked at the arbitrary instrument station datum on the paper will provide sufficient orientation for all further sights taken at this station. Then, with the rangefinder on its stand, one can obtain distance sights 360° about the station, transferring these directly to the map by use of the scaled edge of the stand - as with an alidade. Foresights and backsights must, of course, be used when transferring to new stations. Any physical objective point may, in this manner, be directly transferred to the resultant map. Objectives that are obscured by plant growth for level line-of-sight readings present no difficulty, if they are themselves high enough, by virtue of obtaining horizontal distance through the vertical height scale. Any number of alternatives are available for leveling the instrument, but I use a magnetic base vial level.

Field tests have indicated a number of points of interest for this assembly, as follow: (a) virtually 100% accuracy can be obtained, with practice, for any distances up to 200 feet; (b) for best use it would probably be advisable to add a centered reticle to the scope which will facilitate objective readings; (c) in situations where objectives are obscure due to poor light conditions or lack of contrastive feature, targets such as tin can sections, white cardboard squares, etc. may have to be provided - although this does not materially add to the time involved unless there are a number to be so situated; (d) this equipment cuts by one-third or perhaps one-fourth the time otherwise spent if using a pace-compass method; and, (e) when distances to objectives greater than 180 feet are involved, the rangefinder can be slipped out of its stand and both backsights to the station and foresights to the objective quickly taken from a suitable station-to-objective midpoint.

In my own area of research, islet widths are seldom greater than 1000 to 1500 feet. This would mean, if one employed this procedure, some two to four stations on a cross-islet survey. In all but a very few limited areas, natural or man-made landmarks would provide for a more than adequate number of objective features. The time required to explain and demonstrate the operation of this equipment and procedure has been less than one or two hours (to graduate students) with satisfactory results. The rangefinder itself constitutes the only major item that one could normally not be expected to have as field equipment. The provision of a stand and suitable platform should be within the skills of most individuals. Naturally, there is ample opportunity here for the exercise of one's mechanical ingenuity. Plexiglas, for example, does not have to be used for the base, but it does have the advantage over a material like wood in that one can see the map areas otherwise obscured by the base plate. The end result is, I believe, a system that is simple to learn, rapid in use, accurate, and, for a procedure that has many of the best aspects of plane table-alidade mapping, involves relatively little expense. It is certainly more than adequate for the types of reconnaissance and plat mapping endeavors that involved in my own research. I would think that it might be equally applicable to that of others.

Notes

1 Domm's technique employs field binoculars with inserted reticles for sighting on a centrally located stadia rod. Those who wish to pursue this method further might be interested in investigating compass-bearing binoculars manufactured by Supermarine Products Company (1 Johnson Drive, Raritan, New Jersey, USA 08869). The maker claims accuracy to 1°. The price, unfortunately, is $275, which is quite high for those interested in relatively inexpensive field mapping procedures and equipment.

2 An exception that has recently come to my attention is the United States Army Map series for the Pacific Islands, at a scale of 1:25,000. Many of these are photogrammetric and plane table maps with some reconnaissance verification. They include coastal hydrography based on United States and Japanese HO charts.

3 This research was carried out with a grant and fellowship from the National Institute of Mental Health and with additional support from the Department of Anthropology, University of Washington.

4 Only a few cross-island surface elevation transits were made. To this end I used a chain, a wood rod scaled in feet, and a small power rifle scope with centered reticle. This proved clumsy but reasonably accurate.

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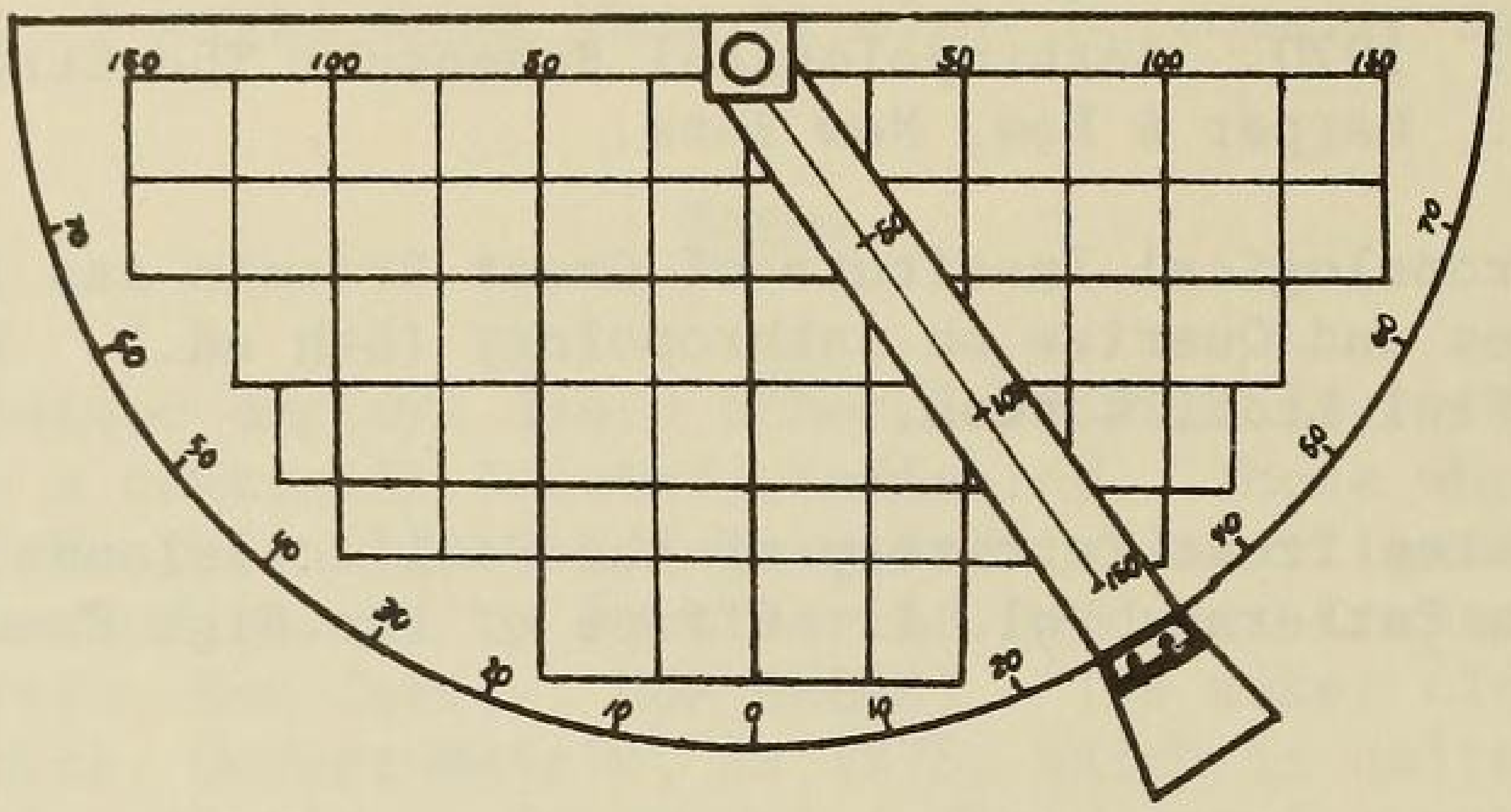

Figure 1 - Height Gauge [Actual scaling reads to 1° and to 5 foot grids, rather than the 25 foot grid as shown above. Vertical height read across, horizontal distance up and down. Pendulum is clear plastic.]

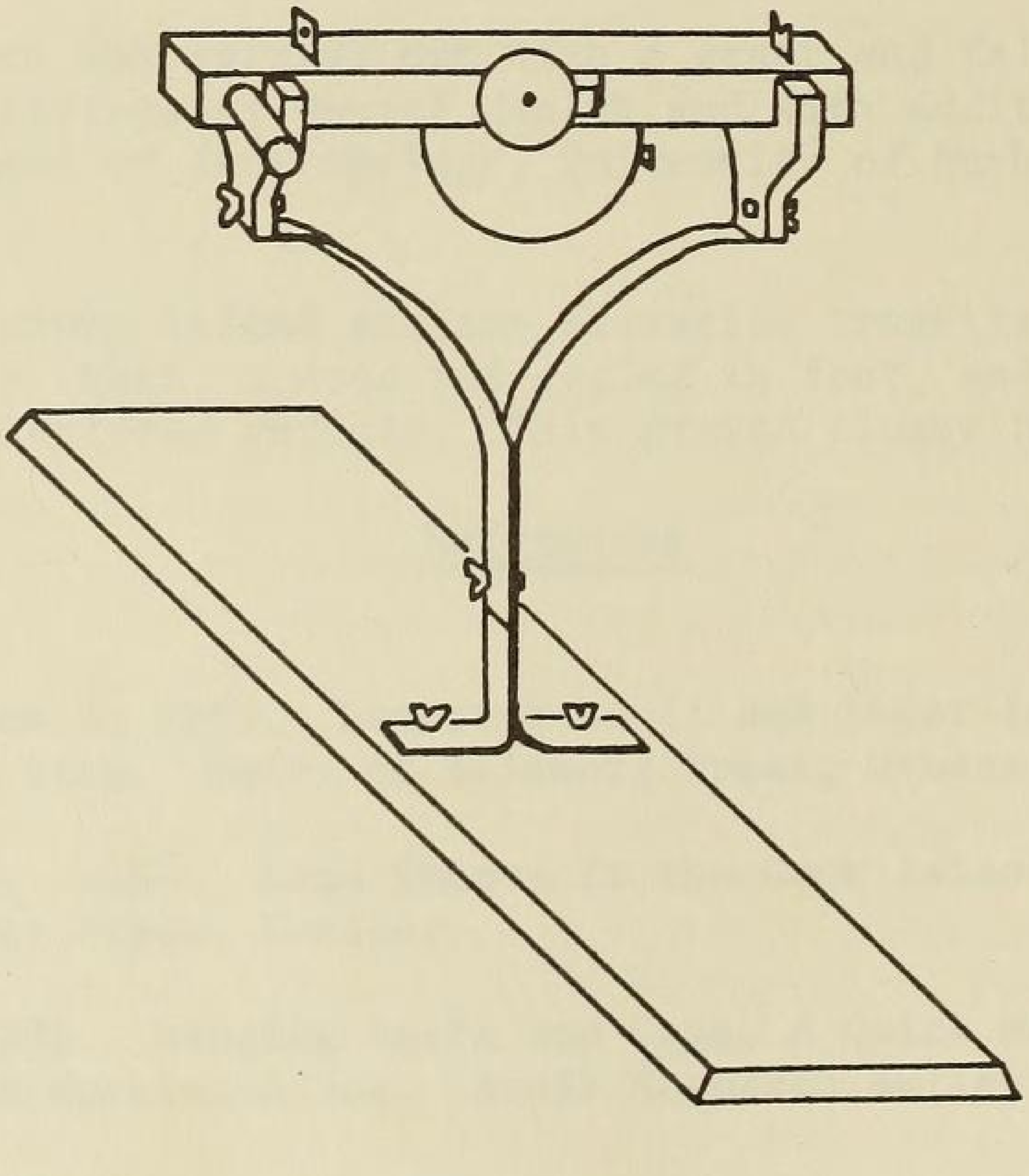

Figure 2 - Rangefinder and Stand Assembly

A DIVER-OPERATED HYDRAULIC DRILL FOR CORING SUBMERGED SUBSTRATES[1/]

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INTRODUCTION

A portable submersible drill was developed that will enable diver scientists to obtain cores 2 1/8 inches in diameter down to penetration depths of 50 feet or more. This hydraulically powered drill unit is a relatively inexpensive tool, consisting of equipment and parts that are readily available from U.S. manufacturers. The drill was successfully field tested both from a boat and from land.

Marine geologists investigating shallow-water environments are in need of an inexpensive and portable device for sampling areas of submerged substrate with minimum logistical support. Some earlier coral-reef investigators undertook blasting, for example, to effectively expose sections of submerged substrates (e.g., Shinn, 1963; Ginsburg and Schroeder, 1969; Goreau and Land, in press; Glynn, personal commun., 1972), but this method of sampling has several drawbacks. In particular, penetration depths are limited and in places blasting may severely alter local environments. As well, the removal of rubble resulting from underwater quarrying requires long hours of diving time.

The drilling unit described below, on the other hand, can produce a core representing a sequence of accumulated reef structure without undue disturbance to the local environment. It must be pointed out, however, that cores obtained with this unit represent only a partial section of the penetrated substrate, and that unconsolidated material thus far has not been fully cored; consequently, any given core may lack some sections of the sequence.

Several types of submersible drill already have been developed and tested--among them, Land's (personal commun., 1970) electric submersible drill that produces a one-inch core, which is slightly larger than that obtained with the U.S. Navy's hydraulic drill (see Ocean Industries, 1973). To date, however, no diver-operated drill having the depth of penetration and core size of the hydraulic drill described here has been available to marine scientists.

Numerous inquiries concerning the design and performance of this drill have prompted the following description, which is given in the hope that other scientists may be able to use the tool successfully in their research endeavors. Our knowledge of underwater substrates in

[1/]Contribution no. 8 of the National Museum of Natural History's Investigations of Marine Shallow Water Ecosystems (IMSWE).

areas accessible to diver-scientists certainly will be enhanced by the use of such a tool in future marine research.

DESIGN AND SPECIFICATIONS

The basic concept employed in designing the submersible drill was to adapt an "Ackley" hydraulic impact wrench to accommodate core pipe and NWM double-tube core barrels (2 1/8" in diameter) that are standard drilling equipment manufactured by the "Acker" Drill Company. The drill unit was assembled from these two sources, with the drill being sent to the Acker Drill Company for fitting and final assembly. The overall specifications and design are given in Table 1.

A ring inserted in the drill by Ackley locks out the impact mechanism, which would otherwise shatter and displace the carbide teeth in the drill bit. During a drilling operation, a reverse control knob on the drill must be locked to ensure that the reverse assembly does not become engaged accidentally and release drill pipe. A manifold attachment on the hydraulic power unit allows both sides (i.e., pressure systems) to be operated on one pair of hydraulic lines. This attachment permits a fluid yield of 16 gal/min, which is required to drive the drill at optimum efficiency.

A 3/4-inch hydraulic hose connects the hydraulic power unit to the drill, except for the last 10 feet, where 1/2-inch hose is used to give the hose-line more flexibility in the working area. Although the submerged operational limits of hose-line length have not been established, we know that the efficiency of drill operation does not change at distances of 300 ft from the hydraulic power unit on surface. We do not foresee any problems with the hose in submerged drilling operations to depths of 150 ft (cf. Black and Quirk, 1970).

During initial testing it was found that offshore drilling requires the support of a research vessel large enough to accommodate the hydraulic power unit (cf. Table 1). The draft of such a vessel, however, might preclude drilling operations in areas where irregular shallow bathymetry is extensive.

Carbide drill bits were more effective for drilling into coral-reef substrate than diamond drill bits, and they are an order of magnitude less expensive. It was also found that although the drill may be operated freely for shallow penetration (e.g., into a large coral head, cf. fig. 1), and passes little or no torque on to the diver drilling to core depths less than 5-10 ft, a tripod and winch are necessary for retrieving core from greater penetration depths (Fig. 2). The drill unit, which together with the short 2-ft core barrel weighs approximately 150 lb, can be handled readily by two divers. However, the weight increase following the addition of drill pipe also necessitates the use of a tripod-winch assembly.

During field testing torque effects on the diver were noted mainly when pipe was pulled from a hole, but this situation was corrected by the addition of a short piece of pipe (3-4 ft section) to the drill handle, so that it could be braced against one of the tripod legs, and thus take up any torque otherwise experienced by the diver (Fig. 2).

FIELD TESTING

The hydraulic submersible drill was first tested in water depth of 15 ft by drilling to depths of 20 ft, down to the volcanic tuff base of the loose framework of Pocillopora reefs located off Panama's Pacific coast. The compressor and back-up equipment were carried aboard Smithsonian Tropical Research Institute's vessel R.V. Tethys for the initial hand-held operations. Recovery was low from the loose framework and, in some cases, the core pipe was difficult to retrieve below 10 ft. Later, a winch on the vessel was used to facilitate retrieval of core pipe, but the difficulties experienced with a shipboard winch led to the building of a tripod for subsequent testing.

In the next stage of tests the tripod was used above water on the fringe reefs off the Caribbean coast of Panama in order to perfect operating techniques prior to further underwater tests. The tripod improved drilling operations considerably by permitting retrieval of core pipe to depths of 46 ft.

The drill operated efficiently throughout a five-week period of testing. Its outstanding features are that the diver may readily control the speed of drilling by a trigger device (Fig. 2), and that instant release is possible at any time during the drilling operation.

Although the drill was easily hand-operated by one diver, drilling required a three-man team: one was needed to operate the drill, a second to operate the winch on the tripod, and a third to assist in adding and removing drill pipe. Despite the good performance of the drill, the operations were relatively time-consuming; for example, under ideal circumstances above water, a 40-ft hole was drilled in two days. Most of that time was spent in retrieving core pipe; when pipe was jammed in sections of a hole, the drill string had to be worked up and down in order to inch the pipe past the tight section. These problems arose in some cases because of poor control over the angle of penetration. With the development of expertise in operating this equipment, however, drilling time is expected to reduce appreciably.

The maximum depth of core penetration to date was 46 ft. Recovery was excellent from solid substrates such as a coral head, or the Miocene siltstone foundation of the Panama Caribbean fringe reefs; in both cases, recovery was 100%. In coring the fringe reefs, however, recovery was considerably lower (33% or less), but this also should improve once water flow and rotation speed of the drill bit are properly controlled.

ACKNOWLEDGMENTS

Special thanks are extended to Jeff King (Ackley Manufacturing Co.)

and Ed Wesolowski (Acker Drill Co. Inc.) for their assistance in assembling the drilling equipment. The generous assistance in field testing operations, and valuable suggestions for improving field operations of Peter W. Glynn, Robert H. Stewart, Gordon W. McLeod and Barry Smith are gratefully acknowledged. Thanks also to Ira Rubinoff, Smithsonian Tropical Research Institute, for providing ship time and other logistical support in Panama. F. R. Fosberg, P. W. Glynn, J. King, H. S. Ladd, J. W. Pierce, and J. I. Tracey read the original MS and offered suggestions for its improvement.

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TABLE 1.--SPECIFICATIONS OF HYDRAULIC SUBMERSIBLE DRILL

Parts	Description	Approximate Costs
Hydraulic wrench	Ackley impact wrench and drill, model 23HS-OC weight: 80 lb overall length: 21 1/2" Chuck RPM: 600 torque rating: 6000-9000 ft/lb*	$ 3,000 (including lockout ring)
Repair kit	for 23HS hydraulic wrench	70
Hydraulic power unit	Ackley hydraulic power unit PU 2-10-2000-Ge and manifold system weight: 1800 lb operating wt size: 50 x 37 x 76"	4,500
Water pump	Acker model APS-7 pumping station, 7.6 GPM at 75 PSI weight: 230 lb size: 36 x 24 x 17"	800
Drill equipment	core barrels, reamers, core catchers, core bits, drill extension rods, water swivel, 100' water hose, custom-made springle to attach drill pipe to chuck (40' hole depth capability)	2,000
Hydraulic hose	Imperial Eastman hydraulic hose and fittings for working distance up to 100' from hydraulic power unit	300
	Approx. Total Cost:	10,670

*This rating is with impact mechanism in operation; with lockout ring, it is 159.25 ft/lb at 16 GPM and 2000 PSI.

Figure 1. Coring a large Pavona sp. coral head. Depth 15 ft. Pearl Islands, Gulf of Panama.

Figure 2. Tripod-winch assembly. Galeta Point, Caribbean coast of Panama. Note pipe braced against leg of tripod and trigger control at operator's right hand.

PUBLICATIONS

REVIEWS:

Stone, B. C. 1970 (1971). The Flora of Guam, Micronesica 6: 1-659. A long standing need for an adequate and up-to-date discussion of the flora of Guam has finally been met. A careful student of systematic botany, building upon all that had gone before, together with his own collecting and study while a professor at the University of Guam, has produced an outstanding book of more than 600 pages, with descriptions, keys, illustrations, scientific and native names, bibliography, and phytogeographic and historical notes, all completely indexed. It was printed as Volume 6 of Micronesica, Journal of the University of Guam, with the date July 1970, although distributed more than a year later.

Guam is a remarkable island. Although its area is only about 210 square miles, several types of habitat are combined: volcanic mountains, up to 1334 feet high, in the southern half, now largely covered by savannah, dominated by sword grass; rolling limestone hills to the north of a low, swampy isthmus, with remnants of native forest; patches of cultivation and gardens, and weeds from many parts of the Pacific and other tropical regions.

The phytogeographic relations of the Guam flora are said by Dr. Stone to be Indomalaysian, and he should be in a position to know, being Curator of the herbarium at the University of Malaya, Kuala Lumpur, Malaysia. He lists 931 species as the present total flora: 6 gymnosperms, 58 ferns and their allies, 262 monocots, and 605 dicots. These represent 546 genera. He believes that 63% of the total have been introduced through the agency of man, including crops and experimental plantings (176 species), ornamental plants (205), weeds (174), and other escapes (30). He regards the other 346 as native, although about 20 of these may have been escapes. The other 327 are discussed under the categories of being endemic, Micronesian, Polynesian, Melanesian, Indomalaysian, Paleotropical, Pantropical and of obscure origin or special distribution.

There is a concise, informative introduction giving the botanical history of Guam, with credit to the work of many; a description of the geographic setting and its environment, with soil and vegetation maps. The phytogeography, agriculture, horticulture and gardens are discussed. Notes are given on how to collect and preserve plants, with a plea for further work on unsolved problems.

The main body of the book consists of a variety of comprehensive keys and the systematic treatment of species, with descriptions and notes about each. The fact that Guam has been a crossroads for shipping between many widely scattered areas in the Pacific, starting with yearly galleons from Manila to America (late 1500s to 1815), followed by extensive shipping from Manila and the Orient, and from Guam to many Pacific Islands, accounts for interesting distributions of plants from and to many regions. This book should be basic to an understanding of the flora of many Pacific Islands.

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Delfinado, M. D., and D. E. Hardy, eds. 1973. A catalog of the Diptera of the Oriental Region. Volume 1, Suborder Nematocera. Honolulu, The University Press of Hawaii. 618 pages, maps on endsheets. Price not given. The Nematocera, including somewhat less that 1/3 of the Diptera (two-winged flies), comprise the great majority of aquatic forms. The 24 families, with 6,226 species, are treated by 20 authors who are leading authorities in their fields. The 2 remaining volumes are in preparation. The book is an excellent and handsome example of printing and binding and is on high-quality paper. References are cited with the listings of taxa, but there is also a 20-page "selected bibliography." All taxa are included in an index.

The region covered is the Oriental Region of Wallace, eastward to Weber's Line, but modified to extend to the political boundaries of West Pakistan, all of India and Burma, and the southern provinces of China. Individual islands are mentioned throughout in listing distribution of species.

Especially when many authors are involved it is extremely difficult to avoid errors in gender-endings of species-names. A cursory examination reveals about a score of such in various families.

This is the first time that a complete and critical catalogue of the Diptera of the region has appeared. It consequently fills a great need and will be of inestimable value.

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Ward, R. G., editor. 1972. Man in the Pacific Islands; essays on geographical change in the Pacific Islands. 1-339, Oxford. Ten authors contribute to this book, eleven essays on quite diverse themes, but with consistently historical perspective and prefaced with introductory general statements that help give unity to the whole volume. With minor exception, the region treated is more particularly the South Pacific and Australian New Guinea. The articles, each comprising a separate chapter are: 1) The Pacific Islands and their prehistoric inhabitants, by J. Golson; 2) The alien and the land of Oceania, by B. H. Farrell; 3) Vegetation and man in the South-west Pacific and New Guinea, by R. G. Robbins; 4) The Pacific beche-de-mer trade with special reference to Fiji; 5) The labour trade, by O. W. Parnaby; 6) Trade and plantations in eastern Polynesia; the emergence of a dependent economy, by C. Newbury; 7) the Makatea phosphate concession, by C. Newbury; 8) Population growth in the Pacific Islands: the example of Western Samoa, by P. Pirie; 9) Land tenure in the South Pacific, by R. G. Crocombe; 10) Indigenous horticulture in Melanesia: some recent changes in eastern New Guinea, the Solomon Islands, and the New Hebrides, by D. A. M. Lea; 11) Urbanization in the South Pacific and the case of Noumea, by W. D. McTaggart.

Bryce Decker

Jennings, J. N. 1971. Karst (An Introduction to Systematic Geomorphology, 7). Cambridge, Mass.: M.I.T. Press, xviii, 252 pp. £ 4.20. Sweeting, M. M. 1972. Karst landforms. London: Macmillan. xvi, 362 pp. £15.00. These are two important books for the reef geomorphologist. Dr. Sweeting (now at Oxford) and Dr. Jennings (at Canberra) were both originally Cambridge geomorphologists, and both have worked widely in the tropics, the former mainly in the West Indies and Central America, the latter in Australia and New Guinea. Their books become the standard textbooks on the subject. They are based on their own work, some of it joint, and that of their many students, and on a deep knowledge of the literature in many, often obscure, languages. Both begin with a consideration of lithology and processes, distinctive karst features--both small-scale such as karren, and larger scale such as dolines, dry valleys and hums. Both authors deal with tropical karst forms, which are of particular interest because of the probability of the inheritance of such features as sinkholes, dolines and hums formed by karst erosion during periods of low sea level in the present-day morphology of reefs. Neither author considers reefs as such, though Dr. Jennings draws attention to Ollier's recent work on raised reef limestones and cave systems in the Trobriand Islands. Both authors explicitly exclude coastal karst features, which, under a variety of regional names (feo, champignon, makatea, ironshore), are found in widely scattered reef areas. This omission is unfortunate, in view of the delicacy of sculpture, the interrelationships of biological, chemical and mechanical processes, and the speed of development of these forms. In spite of these limitations from a reef geomorphologist's point of view, both books are invaluable. I found Dr. Jennings's the best to turn to for a guide to problems of specific features, whereas Dr. Sweeting provides more extended argument and many more examples, many of them little known. One major point of criticism: Dr. Sweeting's referencing is quite unhelpful: citations are numbered and listed in the order of their appearance in the text, and the index does not cover bibliographic entries. Thus to find a citation for a given paper one must go to the index, note the pages on which a given author is cited, look these up and find a series of bibliography citation numbers, then check these one by one to find the reference required. Dr. Jennings gives a simple alphabetic listing by author and earns the gratitude of all.

D. R. S.

Usinger, R. L., 1972. Robert Leslie Usinger, Autobiography of an entomologist, 1-330, San Francisco. Published by the California Entomological Society. Edited by E. G. Linsley, J. L. Gressitt, D. D. Linsdale, and H. V. Daly. During the summer of 1968, in the months before he died, our friend Bob Usinger was persuaded by his friend Gorton Linsley to dictate this remarkable autobiography. To have achieved this, knowing that time was running out, and to have never once let this awareness show in his story is an enviable accomplishment. A living, vital picture of himself was certainly the best gift he could have left to his multitude of friends and admirers. Our thanks go to him for writing the book, to his wife for encouraging him to do it, to her and his friends Linsley and Gressitt for seeing it through the press, and to the Society for publishing it.

As a portrayal of Bob's attractive personality and phenomenal scientific achievements the book leaves nothing to be desired. As a picture of the times, the early middle decades of the 20th Century, the picture seems brighter than the reality. Few people, during that period managed to avoid the complications and frustrations that lessen one's effectiveness the way he did. He succeeded in grasping the good features of his period and avoiding its booby-traps more successfully than any one of my acquaintance. Clearly this was due to much more than luck. His genius for attracting people and his enormous capacity for work, as well as his clear, uncluttered mind made an unequalled combination. His life was tragically short, but his accomplishments were greater than most scientists even hope for.

If one characteristic about Bob comes through in the book above all others, and probably the one that made his life so satisfying, it was that he never lost what Rachel Carson has called "The sense of wonder." In his approach to his entomology he never lost the excitement and delight that he felt in his "bug collecting" as a boy.

This doubtless had a great deal to do with his continuous success and limitless energy all through his life. I had the privilege to be in the field with him in 1935 in Hawaii, and again in 1964 in the Galapagos, as well as working with him in the 1950's on the Pacific Science Board of the National Academy, and have first-hand knowledge that this impression running through the book is real.

In his 55 years Bob must have had one of the most satisfying lives of all American naturalists. He was a living disproof of the theory that adversity is necessary to challenge a person and bring out his potentialities.

I am glad he wrote this book. It will please his friends the most, but one could scarcely want anything better for young people to read who are looking around for motivation. F. R. F.

Bricker, O. P., ed., 1971. Carbonate cements. 376 pp. Johns Hopkins Press. Baltimore. The long-term stability or relative permanence of an island formed of clastic sedimentary materials exposed to the action of storm-driven waves depends in large measure on the lithification or bonding-together of these sediments to form hard rocks. In coral islands this lithification is to a large extent the result of carbonate cementation.

Therefore it was entirely appropriate and of great interest that a conference on carbonate cementation was held on Bermuda, a coral island, at the Bermuda Biological Station in 1969. This volume makes generally available the results of this conference, and it is certainly a major landmark in the course of research on this subject.

The book is an extraordinary collection of succinct papers, each summarizing the results of an investigation relating to a particular example or kind of carbonate cement or bonding material, each paper illustrated with several well-reproduced photographs. Many of the outstanding students of coral-reefs are among the contributors.

The papers are arranged in six parts: I Beach-rock and intertidal cement. II Submarine cementation. III Meteoric water cementation. IV Cementation in ancient rocks. V Chemistry. VI Dolomite and non-carbonate cement. Each part is preceded by an introduction, attempting to summarize the papers and the discussions that they provoked, and indicating the current state of knowledge and what should be done next in the area. They very much reflect the majority views of the panels, and it is perhaps unfortunate that the names of the chairmen of the panels are not given. Of these, of course, the first two are of primary interest to coral reef and island students, though all have a strong bearing on the understanding of reefs and reef-like structures as geological, geographical, and ecological features.

Few serious students of atolls and cays can help having a great interest in beach-rock. Reef-growth, development of vegetation, and beach-rock formation are three obvious stabilizing factors that make these accumulations of skeletal sediments more than transitory phenomena. Other factors have their roles, indeed, but are much less readily isolated and circumscribed.

Therefore, the section on beach-rock will be read with great interest by our audience. However, if anyone expects that the "beach-rock problem" is solved he will be disappointed. The findings, though more precise and well substantiated than what we had before, are just as varied and contradictory as ever. If anything is indicated it is what we have long suspected, that we are lumping more than one phenomenon, with more than one process of origin, under the term "beach-rock". The fascinating and important question of why beach-rock is present or absent in different stretches of the same or very similar beaches is scarcely approached, though it was obviously present in the minds of the panel-members.

The existence of submarine and subaerial (non-intertidal) cementation seems fairly well established, though criteria for distinguishing them from intertidal cementation are not as clear as we might wish.

The presence of part VI including "non carbonate cements" should not mislead anyone into looking for a discussion of phosphatic cementation, or, for that matter, anything else except one non-tropical paper on calcium sulfate cements.

The role of organisms in cement-formation is variously suggested and discussed, though generally rather inconclusively. However, the obvious process of bonding-together of sediments and in-place reef components by the growth of encrusting lithothamnioid algae, Porites, worm-tubes, vermiform mollusks, and other such organisms is scarcely touched upon. Perhaps this was by the definition accepted of cementation, or perhaps by the fact that most of the participants were geologists.

About the only real criticism of the book, from the viewpoint of the non-sedimentologist who wants to understand what holds coral islands together is the use by many of the contributors of esoteric terminology with no suggestion of where one can go to find definitions. We non-mathematical ecologists may also find some of the mathematical expression and reasoning rather hard going, though it clearly makes the book less bulky.

This volume will from now on be indispensable to anyone seriously interested in the processes responsible for the existence and nature of coral reefs and coral islands. We are indebted to those responsible for its editing and publication. F. R. F.

Lewis, David, Jr. 1972. We the Navigators, 345 pp., University Press of Hawaii, Honolulu, 1972. $10.50. With this book, Lewis has changed the subject of indigenous long-distance navigation in Polynesia and Micronesia from pure speculation and romanticism to a reality, based on a, to us, entirely new and unfamiliar conceptual system.

We still lack most of the details. Much of what we know rests on extrapolation and on small pieces of the puzzle gleaned from many sources. But the astonishing fact is that a few practitioners of this vanishing art still exist and that voyages, even for long distances, are still being made with uncanny accuracy without the aid of sextant, chart, or compass.

Thanks to this book, we can gain at least a modicum of understanding of how the Pacific Islands were peopled. Even more important, it is a humbling experience to learn of a totally different, and completely valid, conceptual system and frame of reference that served the Pacific peoples for far longer, and certainly as effectively, as our system of celestial navigation with instruments, charts and compass.

To master this, even to the extent presented here, incomplete as Lewis realizes it is, is an intellectual achievement that is enviable, indeed. We can only suggest that, if these questions intrigue you, you read the book. To our oceanographer readers, we commend the problem of "deep phosphorescence", which we first encountered in this book. We would appreciate any explanation that is available. F. R. F.

Hawaiian cave faunas: Howarth, F. G., 1973. The cavernicolous fauna of Hawaiian lava tubes, 1. Introduction. Pacific Insects 15:139-151. For evolutionists, as well as those interested in island natural history and ecology, this is a "landmark" paper. It introduces the author's remarkable discovery of an endemic cave fauna in Hawaiian lava-tubes, describes the lava-tube ecosystem, and comments on the theoretical implications of this fauna. The lava tubes studied are listed and the ecosystem is diagrammed, both environmentally and as a food-chain-energy-flow system. The characteristics of lavas are described and related to possible dispersal of the cave organisms. Previous knowledge is summarized and a short bibliography provided. Subsequent numbers in the series, by specialist authors will treat the various groups of organisms. It is not often that a whole new biotope is discovered and described in such clear, understandable fashion. Other papers in the same issue:
Schultz, G. A. 1973. The cavernicolous fauna of Hawaiian lava tubes,

2. Two new genera and species of blind isopod crustaceans (Oniscoidea: Philosciidae). Pacific Insects 15(1): 153-162.

Gertsch, W. J. 3. Araneae (Spiders), 163-180.

Fennah, R. G. 4. Two new blind Oliarus (Fulgoroidea: Cixiidae), 181-184. F. R. F.

Armstrong, R. W., Atlas of Hawaii, 1973. 1-222, University Press of Hawaii, Honolulu. $15.00. This book is an absolute must for anyone dealing in any general way with, or at all broadly interested in, the State of Hawaii. The Department of Geography of the University of Hawaii is to be congratulated on the assembling and graphic presentation of an unbelievable amount of information on this island state.

The data presented run the gamut from geography, geology and climate, through natural and applied biology of many branches, to the various aspects of land utilization, human activities of many sorts, and even the pollution that results from certain of these activities. Few fields are left out that are capable of being expressed by maps and diagrams.

The graphic presentation of information, by maps, diagrams, photographs and drawings is on a very effective level. Insofar as can be determined without special research, the quality of the information seems generally very good. Some of the best authorities in the state have been enlisted to provide this information, and the signed chapters are generally excellent.

A few slips have occurred, for example (p.29) the Ieie is a vine, not a tree; (p. 26) the Hala is Pandanus tectorius (sensu lato), not Pandanus odoratissimus; and (p. 82) the Ti is Cordyline fruticosa, to mention only some where we can speak with authority. The color and pattern separation in the maps have not in all cases been too successful, e.g. the vegetation map (pp.64-65) and the land use map (pp. 136-137). The metric system is studiously avoided. These small flaws are only pointed out because this book will unquestionably be the principal source of information on Hawaii to the general public for a long time to come. There undoubtedly will be repeated printings and, hopefully, periodic revisions. These will provide opportunity for continuing improvement.

This will be a most useful book to all who are interested in islands. It is written in understandable language. It is a bit expensive, at $15, considering the probable volume of sales, but must certainly be a recommended addition to most libraries, public and private. F. R. F.

Ladd, H. S., 1972. Cenozoic fossil mollusks from western Pacific islands; gastropods (Turritellidae through Strombidae). U.S.G.S. Prof. Pap. 532:1-79, pls. 1-20. This excellent and scholarly paper adds to our rather meager data on the geological and zoogeographic history of the Pacific islands. It deals with fossils from drill-cores on Eniwetok and Bikini and from exposed elevated reefs in Fiji, Tonga, the Marianas and the New Hebrides. The paper is clear, the descriptions and citations admirable, and the illustrations superb. F. R. F.

Zoberi, M. H., 1972. Tropical Macrofungi, some common species. 1-158, Hafner, N. Y. $16.95. This small book does not treat especially the fungi of islands, but since the selection is mostly of widespread species, it will help place many island fleshy fungi at least to genus, some even to species. Directions are given for collection and study, a synopsis of the major groups, and a so-called key to the families treated. Each genus and species treated is briefly described, and many are illustrated either by line drawings or color photos. It is a useful book but the price is high. F. R. F.

REVIEW OF RECENT LITERATURE:

Biological Research in the Bonin Islands

The Bonin (Ogasawara) and Volcano Islands form a nearly straight island arc (24°13'N - 27°34'N) between the Mariana Islands and Japan at Tokyo Bay. Chichi Jima, the largest of the Bonins, is 531 miles south of Tokyo. Longitudinally, the islands lie between Taiwan and the Hawaiian Islands at 140°51'E - 142°14'E in the North Pacific. They are strategically located for latitudinal distribution studies of marine organisms as they relate to the entire Indo-Pacific realm.

Few studies have been carried out on these islands because of their isolation. Dr. Sixten Bock from Stockholm, Sweden, spent some time in the Bonins in 1914. The results of his studies have been published in several Swedish journals. Japanese studies continued through 1941. Following World War II, few biologists had an opportunity to visit these islands, which had come under the U. S. Naval administration. [A general article, The Bonins and Iwo Jima go Back to Japan, by Paul Sampson, appeared in the July, 1968, National Geographic Magazine (Vol. 134, No. 1). This is well illustrated and has several notes on the plants and animals of the islands.] The islands reverted to Japan in June, 1968, and several Japanese surveys have been carried out since then. The results of these expeditions are noted here in detail because most of them are published in Japanese and appear in relatively obscure journal series. All of these articles are held by the author. Acknowledgements are extended to the U. S. National Science Foundation Liaison office at the American Embassy, Tokyo, to Glenn Seglem and Masashi Yamaguchi of the University of Guam for some of the translations, and to the authors who supplied original copies. Scientists from Tokai University at Shimizu, Japan, visited the islands between June 29 and July 12, 1968, under the leadership of Professor Mitsuo Iwashita, Department of Ocean Engineering. The fishery resources were investigated by members of the Tokyo University of Fisheries between June 29 and July 27, 1968. Dr. Reizo Ishiyama directed this expedition. A group from Tokyo Metropolitan University made a general biological survey between August 6 and 20, 1968, under the auspices of Dr. Yuko Kitazawa of the Department of Biology. Members of the Faculty of Agriculture and Veterinary Medicine, Nihon University, travelled to the islands between August 14 and 24, 1968. They were investigating agriculture, stock raising, fisheries, and forestry. Between November 22 and December 20, 1968, officials from the Ministry of Health and Welfare and the Tokyo Metropolitan government carried out a general survey led by Dr. Minoru Imajima of the National Science Museum. The University of Tokyo and the Tokai

Regional Fishery Research Institute co-sponsored a fisheries investigation between July 16 and 24, 1969. This expedition was headed by Dr. Muneaki Abe from the Institute.

One of the first reports to appear in print was the Survey Report on Nature Conservation of Bonin Islands, the first volume of which was published in March, 1969, by the Tokyo Metropolitan Government. The Table of Contents as translated is:

This volume is primarily text; however, lists are given for plants, a few marine invertebrates and algae, and fish.

An expanded, 251-page volume with the same title was published in March, 1970, as Volume 2. It contains more extensive information concerning the outline of the survey:

The remaining four chapters have the same titles and authors as Vol. 1 but each is expanded to include more listings of plants, land snails, and birds. Numerous color photos appear in both volumes.

Nihon University released a short publication in 1969 entitled Expedition to the Bonin Islands (1968). It includes brief sections on soils, forests, shore fishes (with a list of 90 species), livestock, and a discussion of the future of agricultural economics and floriculture.

During the summer of 1969, the Ministry of Education sponsored a survey, the findings of which appeared in print in 1970 as The Nature of the Bonin and Volcano Islands. The translated Table of Contents is:

This was published by the Higher Education and Science Bureau, Ministry of Education and Cultural Properties Protection Division, Agency for Cultural Affairs. It is quite well illustrated, and almost all the articles have relatively detailed English abstracts.

The only exclusively marine-oriented publication to appear to date is Report on the Marine Biological Expedition to the Ogasawara (Bonin) Islands, 1968, sponsored by the Toba Aquarium and the Asahi Shimbun Publishing Company. Of the three articles, the last one is in English:

The first chapter lists 149 species and illustrates 30 specimens. The relative abundance--very abundant, commonly seen, few, or hardly ever seen--of the fishes is given for six of the different islands. A table giving the distribution of 76 butterfly fish species (Chaetodontidae) compares the Bonins with the Marshall and Mariana Islands, Kii Peninsula, Ryukyu Islands, and the Philippines. In Chapter 2, 282 species of gastropod and bivalve molluscs are listed, forty-six of which are illustrated by photographs. The marine invertebrate chapter lists 210 species collected in shallow waters. Identifications were made in collaboration with such other Japanese specialists as M. Eguichi, F. Utinomi, Y. Miya, S. Miyake, and T. Sakai. Thirteen species are considered new records from Japanese waters. This article is beautifully illustrated by photographs of 206 of the species. Seventeen color photographs of this expedition appear in the October, 1968, Kagaku Asahi.

Most comprehensive of all is the two-volume work Nature in the Bonin Islands, compiled by T. Tuyama and S. Asami and published by the Hirokawa Publishing Company in 1970. One volume is text; the other consists entirely of 566 color photographs keyed to the text volume. The photographs have both Japanese and English titles. Although these volumes are expensive, they are welcome additions to the natural history of these islands. The text volume, 271 pages, is in Japanese with extensive lists of scientific names of organisms with specific locations. Many of these lists are reviews of earlier published works. Each section has a different author. Three chapters are devoted to historical, geological, and developmental studies. The biological chapters are:

(4) Plants, by T. Tuyama, contains a list of plants, eight black-and-white plates of vegetation, and separate lists of monocots and ferns.

(5) Land Animals, by H. Hasuo, includes a section on birds with a note as to whether they are extinct, introduced or a subfossil, and fresh water snails with 3 species.

(6) Marine Organisms, by M. Imajima, contains a list of 103 species of scleractinian corals, 16 species of octocorals, 20 species of crustaceans with 21 photographs, 11 species of shells with three pages of colored plates, 74 species of echinoderms, and 49 species of algae.

(7) Fishes, by H. Sugiura, contains a listing of 238 species.

The photograph volume contains some errors, perhaps typographical, such as Bufo marianus (Pl. 5-46, 5-47) which should be B. marinus, and Acatina (Pl. 5-63, 5-64) which should be Achatina (as is given in the text, p. 177). Some misidentifications also appear: Pl. 7-8 is Runula tapeinosoma, not Aspidontus striolus; Pl. 7-18 is Pterois volitans, not Brachirus zebra; Pl. 7-39 is Cephalophilus urodelus, not Variola louti; and there are a few other names throughout the volume which are not now currently accepted.

L. G. Eldredge

MISCELLANEOUS:

List of recent publications of the Pacific Scientific Information Center, furnished by E. H. Bryan, Jr.:

Life in the Marshall Islands, by E. H. Bryan, Jr. August, 1972. $5.00. Tells the story of plants, animals and man, and of their interrelationship on the atolls of eastern Micronesia, against the background of the vast Pacific area.

Some of the 22 chapters, which fill 237 pages are: Pacific geography made easy, Man comes into the Pacific, What is an atoll? It gives an introduction to the plants, birds, insects, fishes, marine shells, and the interrelationship of life on a coral reef. It describes "Making a living on an atoll," canoes, navigation, the day's work. There is a chapter on Decorative arts of the Marshall Islands by Dr. Adrienne Kaeppler. The story is told of the discovery and history of these islands through two World Wars, the beginning of reconstruction, and the displacement of persons by atomic bombs.

All of these subjects are illustrated by 13 maps and diagrams and more than 200 drawings of plants, animals and artifacts.

Field Guide to the Birds of French Polynesia, by Phillip L. Bruner, with 15 plates by O. G. Dykes, July, 1972, with soft cover, price by mail $3.00. Mr. Bruner spent a year in the Society, Tuamotu, and Marquesas Islands, from 1970 to 1971, making a survey of the bird life and its environment, as background for an extensive study of the bird genus *Acrocephalus*, family Sylviidae or Old World Warblers.

So little information is available in print concerning the bird life of this portion of the South Pacific that he was persuaded to put his field observations into print. This book should be of much interest to all who thrill to the wildlife of the South Seas.

This is Mr. Dykes' first attempt to depict live birds. Judging by the results, it is safe to say that it will not be his last.

This book, with 135 pages and 15 plates, is one of a series of accounts of Pacific area natural history being produced by the Pacific Scientific Information Center.

Land in Micronesia and its resources: An annotated bibliography. Compiled by E. H. Bryan, Jr. and Staff for the Trust Territory of the Pacific Islands. 119 pages, map. $3.00

Bryological Bibliography of the Tropical Pacific Islands. Compiled by H. A. Miller, H. O. Whittier, R. M. del Rosario, and D. S. Smith for the Standing Committee on Pacific Botany of the Pacific Science Association. 51 pages, 1971. $2.00

Guide to Place Names in the Trust Territory of the Pacific Islands. Compiled by E. H. Bryan, Jr. for the Trust Territory of the Pacific Islands. 406 pages, 114 maps, 1971. $5.00

Pacific Anthropologists 1971. 88 pages and a folder of additions and corrections. $1.00

Guide to place names in the Hawaiian Islands. (In Preparation). This will be the first part of a guide to place names in Polynesia.

All these publications may be ordered, prepaid, from Pacific Scientific Information Center, Bernice P. Bishop Museum, P.O. Box 6037, Honolulu, Hawaii 96818. Prices listed above included direct delivery by mail.

[Endean, R. & Mather, P., eds.?]. The Proceedings of the Second International Symposium on Coral Reefs. 2 volumes. (To be published in July 1974) $25.00 (Australian) per volume. Orders should be sent to Dr. Patricia Mather, Queensland Museum, Gregory Tee, Fortitude Valley, Brisbane 4006, Qld., Australia.

Hoffmeister, John Edward, 1974: Land from the sea, The geologic history of South Florida. University of Miami Press, Coral Gables, Florida. 143 pages, 75 figs. $7.95. This story, written for the layman, describes the development of North America's most extensive coral reef area but the importance of the reefs in the building of South Florida is properly evaluated and they are fitted neatly into a broad setting that encompasses other environments, both marine and terrestrial.

The book has the important attributes of a good story. It is soundly based, well organized, brief and, most importantly, it has been written by a talented story-teller. It reads smoothly and easily. It deals with swamps, including the Everglades, with coastal ridges, barrier islands and the remarkable Keys. It describes a petrified mangrove forest and even includes a section on the water resources of the area.

The numerous maps, charts, diagrams and photographs (more than half the work of the author) are closely tied to the text and are conveniently placed in it. Several of the charts suffer from excessive reduction and the captions of one or two of the figures could be clarified but there is a notable lack of topographic and other minor errors. The book should have great appeal to the ever-growing numbers of residents and visitors who are interested in their surroundings. Anyone equipped with a hand lens can sally forth and see for himself some of the complexities hidden beneath and adjacent to the apparently featureless Florida landscape.

The geologic story in Land from the Sea brings together a number of the discoveries of recent years. Many of these discoveries were made by the author and his associates. Full credit is given in the section on acknowledgments and in the list of references. Perhaps the most surprising of the several discoveries was the recognition of a new and important unit of the geologic formation long known as the Miami Oolite Limestone. This unit, whose significance was jointly discovered by the author and Axel Olsson, was found to extend over an area of some 2,000 square miles. It was named the Bryozoan facies and its interpretation was aided by a study of conditions existing today in the nearby Bahamas. Field work showed that the channeled Miami Oolite of Florida, now above sea level was closely similar to the undersea oolitic bank of the Bahamas that is channeled by tidal currents. Likewise, the same species of bryozoan that flourished in Florida during the Pleistocene now grows over the Bahama bank. Indeed, the Pleistocene features of Florida are, in effect, the mirror image of conditions now existing in the Bahamas. Hoffmeister and his associates have discovered one of the finest examples of the doctrine of Uniformitarianism that I know of. The past can be explained in terms of the present, as Mr. Lyell postulated nearly 150 years ago.

Harry S. Ladd

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