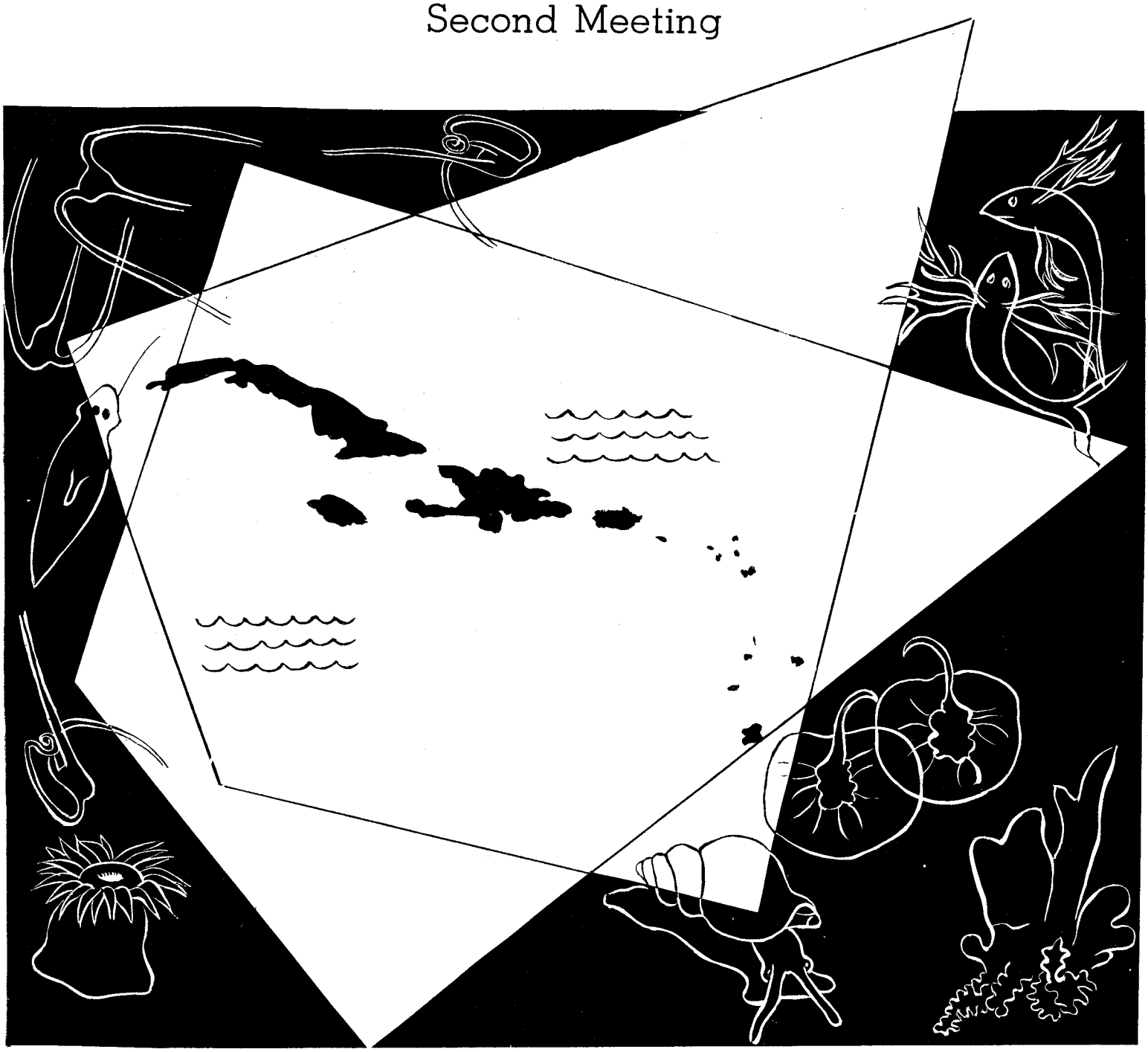
Ray Waldner

ASSOCIATION OF ISLAND MARINE LABORATORIES

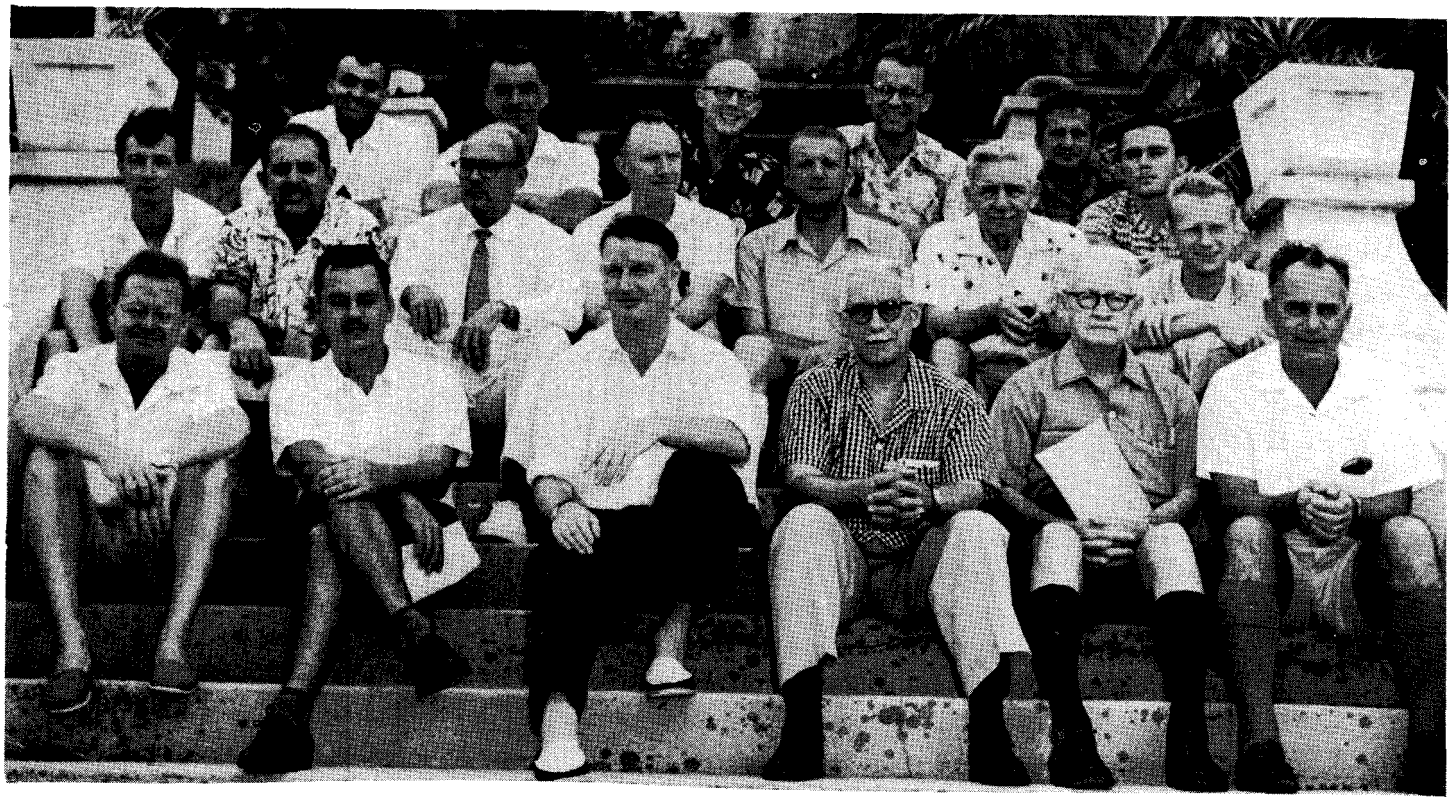
Second Meeting



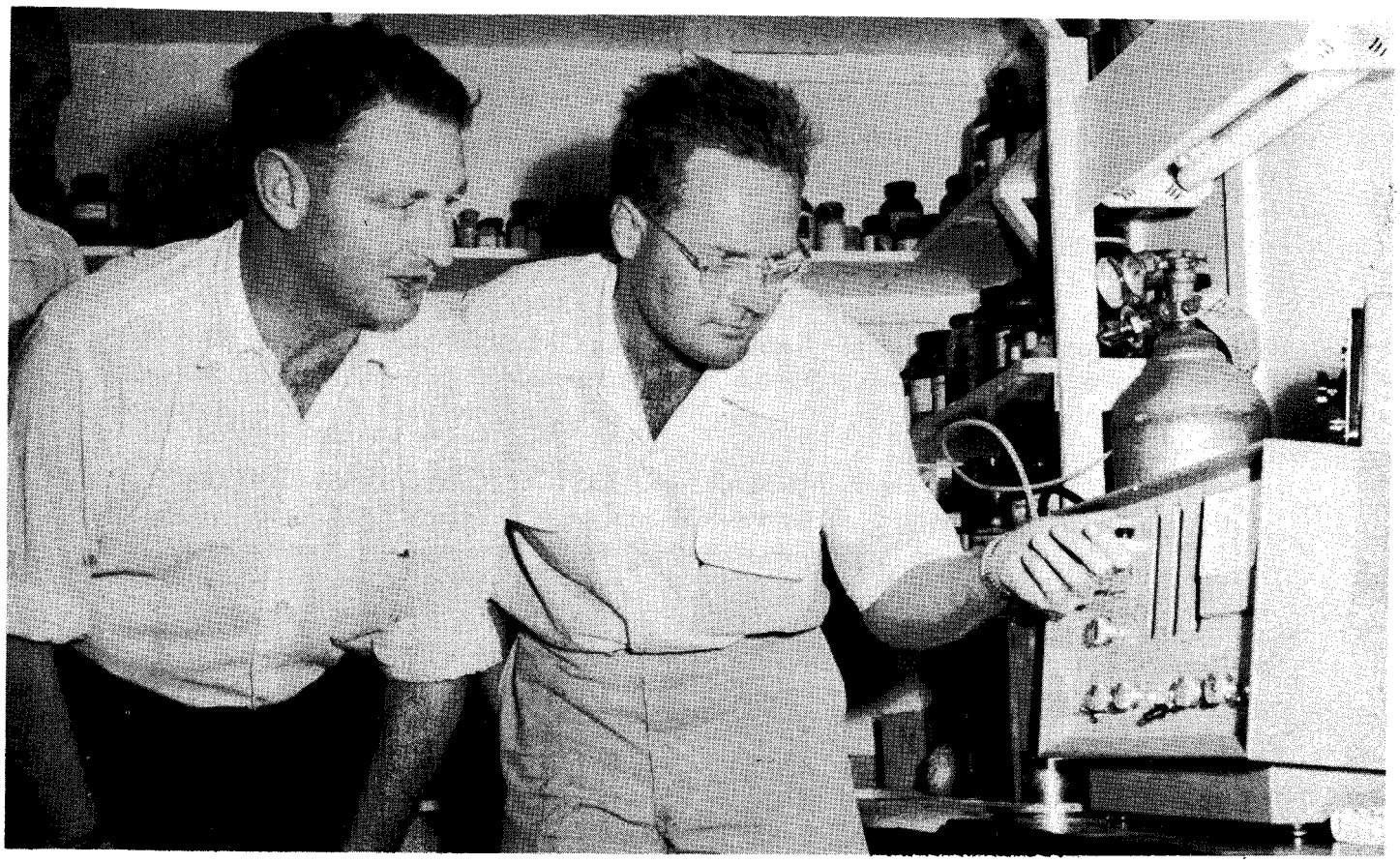
BERMUDA BIOLOGICAL STATION

BERMUDA, B. W. I

September 17-21, 1958



Members of the Association of Island Marine Laboratories pose on the steps of the Biological Station at St. George's West, Bermuda



The Director of the Bermuda Biological Station, Dr. William H. Sutcliffe, shows Dr. David M. Steven the operation of one of the decade scalers used at the laboratory for the determination of productivity of phytoplankton by the C^{14} method.

ASSOCIATION OF ISLAND MARINE LABORATORIES

SECOND MEETING

Bermuda Biological Station, Bermuda, B.W.I.
September 17--21, 1958

Representatives of marine laboratories of the Southwest North Atlantic and Caribbean Area assembled in Bermuda, September 17 to September 21, inclusive, 1958, for the second meeting (following the organization meeting in Puerto Rico in 1957). The meeting enjoyed the sponsorship of the Bermuda Biological Station, the Bermuda Aquarium and the Bermuda Trade Development Board. The laboratories represented, their official representatives and the accompanying participants were the following:

BELLAIRS RESEARCH INSTITUTE OF McGILL UNIVERSITY, St. James, Barbados, B.W.I., Dr. John B. Lewis, Director.

BERMUDA BIOLOGICAL STATION, St. George's West, Bermuda, B.W.I., Dr. William H. Sutcliffe, Jr., Director; with Dr. Lowis Mowbray, Director of the Bermuda Aquarium; Dr. David W. Menzel and Colonel W. E. Stevens (regular members of the staff of the Station); and Dr. Alexander Ivanoff, visiting scientist from the Musée d'Histoire Naturelle, France.

CARAIBISCH MARIEN-BIOLOGISCH INSTITUUT, Willemstad, Curacao, N.A., Dr. J. S. Zaneveld, Director.

INSTITUTE OF MARINE BIOLOGY, University of Puerto Rico, Mayaguez, Puerto Rico, Dr. Juan A. Rivero, Director; Dr. R. E. Coker, Consultant; and Juan Gerardo González, Research Assistant.

LERNER MARINE BIOLOGICAL LABORATORY, Bimini (Address-1112 Du Pont Building, Miami 32, Florida, or American Museum of Natural History, New York City), Dr. Norman Newell, Curator of Invertebrate Paleontology.

OFICINA HIDROGRAFICA DE LA MARINA DE GUERRA CUBANA, Habana, Cuba, Dr. Luis Howell Rivero, Director. Dr. Howell Rivero represented, also, the Universidad de la Habana and the Instituto de Pesquería, Habana.

UNIVERSITY COLLEGE OF THE WEST INDIES, Kingston, Jamaica, B.W.I., Dr. David M. Steven, Professor of Zoology and Director of the Marine Laboratory at Port Royal; with Dr. Ivan M. Goodbody from the Biology Department and Dr. F. John Vernberg, visiting scientist from Duke University.

UNIVERSIDAD DE SANTO TOMAS DE VILLANUEVA, Marianao, Habana, Cuba.
Dr. José Suárez Caabro, Professor of Zoology and Director of the Marine Laboratory.

Attending, by invitation, were: Dr. Luis Rivas and Dr. Felipe Martin from the La Salle Foundation of Venezuela who enthusiastically presented plans for the proposed marine laboratory at Isla Margarita off the Northern coast of Venezuela; Dr. Raymond MacAllister, from the Navy SOFAR Station at Bermuda, who was very kind in showing the visitors some of the places of interest; and Dr. Carlos González Nuñez, Director of the Botanical and Zoological Research Institute, University of Santo Domingo, Ciudad Trujillo, Dominican Republic, who is particularly interested in developing a marine station in his country.

The success of the meeting was, in good part, the result of fine cooperation of the following persons and organizations: Dr. William Sutcliffe, Jr., Director of the Bermuda Biological Station, who was most efficient in respect to reservations, who made every effort to insure that conferees derived high satisfaction from their stay at the Bermuda Biological Station, and who, with Mrs. Sutcliffe, extended a cordial welcome and entertainment in their home; the Bermuda Trade Development Board, whose generosity made the meeting possible; Mr. Lowis Mowbray, Director of the Bermuda Aquarium, who offered all the facilities of the Aquarium, devoted most of his time to making the stay of visitors a pleasant and confortable one, and assisted Dr. Sutcliffe in extending activities beyond the Bermuda seashore.

All participants were extremely pleased with the cordial reception given by the Colonial Secretary, J. W. Sykes, E.S. Zuill, Trustees of the Bermuda Laboratory and Mrs. Zuill, and with the generous dinner party at the Boat House of Deepdene Manor.

The warm hospitality and sincere welcome given to all the conferees by these leading people of Bermuda contributed to promote official and personal relations among all the members of the Association and to better the opportunities for cooperative research. All participants in the meeting were more than grateful.

PROGRAM

WEDNESDAY, 17 SEPTEMBER

Morning Session, 9:00 A.M. (Presentation of Papers)

STEVEN, DAVID M., University College of the West Indies, Jamaica, B.W.I. (A scheduled report by Dr. David M. Steven was postponed to the evening session)

GOODBODY, IVAN M., University College of the West Indies. Ecological Studies of Ascidia nigra. (Abstract appended).

MARGALEF, RAMON, Institute of Marine Biology, University of Puerto Rico. Ecological Meaning of Quantitative Differences in the Composition of Pigments Extracted from Corals and other Colonial Polyps. (Presented by Juan Gerardo González) (Abstract appended)

VERNBERG, JOHN, University College of the West Indies. Some Physiological Differences of Fiddler Crabs from the Tropical and Temperate Zones. (Abstract appended)

AFTERNOON

2:00 P.M. to 4:30 P.M. (Free Period)

4:30 P.M. Entertainment at home of Director and Mrs. William H. Sutcliffe, Jr.

Evening Session 8:00 P.M. (Presentation of Papers)

Address of the President, David M. Steven (Abstract appended)

DAVID M. STEVEN, University College of the West Indies. Report on some Papers Presented in the Marine Biology Section of the VIth International Congress of Zoology in London. (Transferred from Morning session)

THURSDAY, 18 SEPTEMBER

Morning Session A.M. (Presentation of Papers)

MARGALEF, RAMON, and Juan Gerardo González, Institute of Marine Biology University of Puerto Rico. Densification of Phytoplankton in the Vicinity of a Shallow Coast Subjected to Intense Evaporation. (Presented by Juan Gerardo González) (Abstract appended)

DIAZ-PIFERRER, MANUEL, Laboratory of Marine Biology, University of Oriente. Ecology of Some Species of Commercial Marine Algae of the Caribbean. (Abstract appended)

MOWBRAY, LOUIS, The Aquarium and Bermuda Biological Station. A Preliminary Report on the Seriolas (Amberjacks) of Bermuda. (Abstract appended)

DUARTE, PEDRO PABLO, Laboratorio de Biología Marina, Santo Tomás de Villanueva. Contribution to the Study of Cuban Hermatipic Scleractinia. (Presented by José Suárez Caabro) (Abstract appended)

GOODBODY, IVAN, University College of the West Indies. Mortality of Marine Fishes Following Tropical Rainstorms. (Abstract appended)

Afternoon Session (Presentation of Papers)

SUAREZ CAABRO, JOSE, Laboratorio de Biología Marina Santo Tomás de Villanueva. Salinity, Temperature and Plankton of the Coastal Waters of the Isle of Pines, Cuba. (Abstract appended)

MENZEL, DAVID, Bermuda Biological Station. Productivity Studies in the Sargasso Sea. (Abstract appended)

IVANOFF, ALEXANDRE, Bermuda Biological Station. An Optical Method of Investigation of the Oceans: The P-Beta diagram. (Abstract appended)

Evening 6:00 P.M.
Complementary dinner at the Boat House of Deepdene Manor

FRIDAY, 19 SEPTEMBER

Morning Session 9:00 A.M.

MARGALEF, RAMON and JUAN A. RIVERO, Institute of Marine Biology, University of Puerto Rico. Succession and Composition in the Thalassia Community. (Presented by Dr. Juan A. Rivero) (Abstract appended)

STEVEN, DAVID M., University College of the West Indies. Studies of the Shoaling Behavior of Fish. (Abstract appended)

NEWELL, NORMAN, Lerner Marine Laboratory. The Great Bahama Bank. (Abstract appended)

GONZALEZ, JUAN GERARDO and R.E. COKER, Institute of Marine Biology, University of Puerto Rico. Distributional Patterns of the Marine Copepoda of the Southwest Coast of Puerto Rico. (Abstract appended)

Afternoon Session 2:00 P.M. (Business Meeting)
Evening Meeting 7:00 P.M. (Business Meeting)

SATURDAY, 20 SEPTEMBER (Free period)

Morning free for personal conferences and pursuit of individual interests.

In the afternoon the whole group was presented by the sponsors with a tour around the Bermuda Islands to historic Fort Catherine, the well-operated Aquarium and the magnificent Cristal Caves. Participants enjoyed also the picturesque and almost aerial view from monumental Gibbs Hill Lighthouse.

SUNDAY, 21 SEPTEMBER

The week of meetings, conferences and "get togethers" ended on Sunday with a very pleasing and educative trip to the offshore coral reefs of Bermuda. The sea remained calm throughout the day; the sun was extremely bright; the high light-penetration invited a good lot of diving in search of Bermudian specimens of corals, mollusks, and sponges. At 4:00 P.M. the group was back at the Station, all enthusiastic over the beauties of the reefs and the life surrounding them and the ocean floor.

APPENDIX

BYLAWS
ASSOCIATION OF
ISLAND MARINE LABORATORIES

ARTICLE I
NAME

Section 1. The name of the association shall be Association of Island Marine Laboratories.

ARTICLE II
PURPOSE

Section 1. The purpose of the Association is to advance common interest in the marine sciences by:

a. Arranging meetings

b. Fostering personal and official relations between members

c. Assisting or initiating cooperative research programs

d. And in any other way that may be desirable

ARTICLE III
MEMBERS

Section 1. Institutional members shall be those island marine laboratories of the tropical and subtropical Atlantic that the Association invites to membership, or those laboratories that were members prior to the approval of these Bylaws.

Section 2. Representation of institutional members at meetings and other activities of the Association shall be through the Directors of the respective institutions or their representatives. One person may be permitted to represent more than one institution, but may excercise one vote only.

Section 3. Only representatives of institutional members are eligible for the posts of president and vice-president of the Association.

Section 4. Individual members shall be staff members of the different island marine laboratories or scientists who have worked in any of the member stations or have special interest in problems pertaining to the marine sciences of the Tropical Atlantic and Caribbean.

Section 5. Individual members may vote at all meetings except on matters of major policy, as may be determined by the Board of Officers.

Section 6. Applicants for membership, before being accepted, shall be approved unanimously at a meeting of the Association.

Section 7. Annual dues of institutional members shall be $20.00. Annual dues for individual members shall be $3.00. Any institution or person accepted for membership who shall fail to qualify within two months after notification shall be deemed to have declined the invitation.

Section 8. Any member whose dues are in arrears for one year will be suspended from membership until his arrears have been paid.

ARTICLE IV
MEETINGS

Section 1. The Association shall meet at one of the member institutions to be chosen at the previous meeting or subsequently by the Board of Officers.

Section 2. Representation of half of the institutional members shall constitute a quorum.

Section 3. Robert's "Rules of Order" shall govern the meetings of the Association, except where inconsistent with these Bylaws.

ARTICLE V
OFFICERS

Section 1. There shall be a Board of Officers composed of President, First and Second Vice-Presidents, Secretary-Treasurer and three members at large. (See Sect. 3 Art. III). All officers shall retire at each meeting but may be nominated for re-election.

Section 2. In case of a vacancy this can be covered by appointment by the Board, until the successor is duly elected at a regular meeting of the Association.

Section 3. The following shall be the duties of the President:

Preside at the meetings of the Association and Board of Officers; represent the Association in meetings, international congresses and legal affairs; excercise general supervision over affairs of the Association; call to the attention of the Board such subjects as in his opinion require consideration; determine the order of the day in administrative sessions of the Association and Board and give, annually, a report on the status of the Association and its plans for the future. He shall be ex-officio member of all standing committees.

Section 4. The following shall be the duties of the Vice-Presidents:

The Vice-Presidents, in order of seniority, in case of death, absence, resignation or disability of the President, shall perform his duties and exercise his powers.

Section 5. The following are the duties of the Secretary-Treasurer:

The Secretary-Treasurer shall cause notices to be issued of all meetings of the Association in colaboration with the host station (see Sec. 1 Art. IV) and the President, prepare the program for the meetings of the Association and Board of Officers, attend all such meetings and keep the minutes thereof. He shall conduct the correspondence of the Association; have custody of the archives and books of account and collect, receive and have custody of the funds and securities of the Association. He shall pay all bills and appropriations, shall keep regular and correct accounts and shall submit reports to the Association at its annual meetings. The fiscal year of the Association shall be from July 1 to June 30.

Section 6. The following shall be the duties of Members at large:

Members at large shall be expected to attend all meetings of the Board and Association and shall, in order or priority in appointment, substitute for the Secretary-Treasurer in case of death, absences, resignation or disability.

Section 7. Any four members of the Board shall constitute a quorum of the Board.

ARTICLE VI

COMMITTEES

Section 1. The President may appoint committees as authorized by the Association or as he feels desirable in order to guarantee the smooth operation of the Association.

ARTICLE V

AMENDMENTS

Section 1. These Bylaws may be amended, either by change or repeal of any provision or the adoption of new provisions, at any meeting of the Association by majority vote of members present.

ABSTRACTS OF PAPERS PRESENTED AT THE SECOND MEETING OF THE ASSOCIATION OF ISLAND MARINE LABORATORIES

ECOLOGICAL STUDIES ON ASCIDIA NIGRA

By
Ivan M. Goodbody
University College of the West Indies
Mona, St. Andrew, Jamaica, B.W.I.

Three principal topics are being studied in Jamaica: a) reproduction, b) growth, c) population growth and survival.

Breeding seasons have been studied by the weekly examination of microscope slides suspended in the sea, and counting the number of newly settled ascidians. Results so far obtained indicate that A. nigra breeds throughout the year but probably has a peak of breeding activity in the autumn and early winter. Animals are capable of breeding when 8 to 10 weeks.

Growth and population cycles have been studied on tuffnol plates suspended beneath a floating raft: a large population has been induced to grow on these plates. Growth is continuous over the first 12 months of life but is most rapid in the first 3 months. Colonization of clean surfaces is very rapid and once established a population remains fairly stable for a long time. Mortality of individuals is very high (at least 98%) in the first 4 week after larval settlement, but is low after that (15% and 25% respectively in 11 months in two groups studied). Eighteen to 20 months is the maximum age to which animals live. The work is still in progress.

(Author's abstract)

ECOLOGICAL MEANING OF QUANTITATIVE AND QUALITATIVE DEFFERENCES IN THE COMPOSITION OF PIGMENTS EXTRACTED FROM CORALS AND OTHER COLONIAL POLYPS

By
Ramon Margalef
Institute of Fishery Investigations, Barcelona, Spain and Institute of Marine Biology, University of Puerto Rico

A nomograph is designed where optical density of acetone extracts at two wavelengths (440 and 665 mu) are entered on logarhythmic scales intersecting at an angle of 120°. The position of each sample, defined by a point, reveals characteristics of the population sampled--near top for actively multiplying diatoms, near lower border for populations comprising chiefly dinoflagellates. The nomograph is useful for plotting stage of development of populations or for comparison of populations at different depths or locations. Points representing similar biomass lie approximately on an oblique line running from lower left to upper right. Even productivity can be estimated. The method was applied to extracts from several species of corals having truly symbiont dinoflagellates as well as skeletal algae rich in chlorophyll.

Branched corals have less pigment (and presumably less algae) per unit of surface than do massive corals, but they have more surface. Studies were made of algae in dead corals and rocks, in Thalassia and in phytoplankton. Phytoplankton succession starts always with high power-output and low efficiency (high total pigment, low D440/D665 quotient) and proceeds to accumulation of biomass, drop of productivity, and high efficiency. Corals offer a more steady state than phytoplankton. The nomograph may be useful for presenting synoptic data.

(R.E.C.)

SOME PHYSIOLOGICAL DIFFERENCES OF FIDDLER GRABS FROM THE TROPICAL AND TEMPERATE ZONES

By
F. John Vernberg
University College of the West Indies
St. Andrew, Jamaica, B.W.I.

Studies of the physiological variation of closely related species from widely separated geographical areas were undertaken for the purpose of better understanding the role of physiology in the distribution of these organisms. Fiddler crabs of the genus Uca from Beaufort, North Carolina, Miami, Florida and Jamaica, B.W.I. were used.

The first phase of this study dealt with determining the thermal limits of these organisms and the influence of low temperature acclimation on their response. At 42° and 44°C. Uca rapax, a tropical form, survived longer than Uca pugnax from North Carolina. After being maintained at 15°C. for 7-10 days, both species responded in a similar but a marked decrease in ability to withstand these high temperatures. This was noted when compared with nonacclimated forms. At low temperatures a dramatic difference is noted between tropical and temperate zone forms. The tropical forms survived for short periods of time at 10°C. (50% mortality at 40 minutes) whereas temperate zone species lived for at least 30 days with little mortality. Although tropical forms showed but slight change in response after being maintained at 15°C. for 7 days, temperate zone species exhibited a marked gain in cold resistance.

Secondly, the oxygen consumption of seven species of Uca was measured over a wide temperature range. In addition the influence of cold acclimation on oxygen consumption was observed . The significance of Q10, size, season, and starvation was discussed. These findings were correlated with the distribution of fiddler crabs.

(Author's Abstract)

ADDRESS OF THE PRESIDENT

David M. Steven
University College of the West Indies
Mona, St. Andrew, Jamaica, B.W.I.

The President reviewed briefly the origin and formation of the Association and gave a personal appreciation of the value derived by personal contact with scientific colleagues working in the field of marine biology in the Caribbean area. He expressed the hope that whatever co-operative projects the Association might later develop, the basis of its activity would be the meeting from time to time, at which members would renew their personal friendships.

Following is an abstract of the paper he presented at the XVth International Congress of Zoology in London in September 1958.

"Four new marine laboratories have been founded in the Caribbean area during the past five years. They are the Bellairs Institute of McGill University in Barbados, the Carabaisch Marien-Biologisch Instituut in Curaçao, the laboratory of the University of Puerto Rico at Maguey, Puerto Rico, and that of the University College of the West Indies at Port Royal in Jamaica. The first two are research institutes with limited accommodation for visiting scientists, while the other two are intended primarily for teaching undergraduates and providing research facilities for the staffs of their respective universities. Together with the Lerner Marine Laboratory at Bimini in the Bahamas, the Marine Biological Station and Government Aquarium in Bermuda and the marine biologists of Cuban universities these laboratories form the Association of Island Marine Laboratories, devoted to the exchange of information, mutual assistance and co-operation in research programmes affecting the whole area. The member laboratories of this Association are distributed over the whole area of reef-building corals of the tropical western Atlantic. Throughout this great sea area the marine flora and fauna and hydrographic conditions are very uniform and there is therefore a considerable field of common interest in the problems which accupy the attention of the staffs of the member laboratories."

DENSIFICATION OF PLANKTON IN THE VICINITY OF SHALLOW COASTS SUBJECTED TO INTENSE EVAPORATION

By

Ramón Margalef
Institute of Fisheries Research, Barcelona, Spain and Institute of Marine Biology, University of Puerto Rico

and

Juan Gerardo González
Institute of Marine Biology, University of Puerto Rico

Circulation towards the coast, induced by the intense local evaporation, indicates a densification of phytoplankton that proceeds in two steps: first, an increase of diatoms of high productivity and second, passage to a more mature community of dinoflagellates

that can accumulate a higher biomass which may become very concentrated by the action of different physical and biotic mechanisms. This pattern is conserved as the general system seems to be in an almost steady state. It is quite different from those found in other types of coastal environments: estuaries, upwelling of waters, etc.

Diffusion maintains populations of Copepoda. Larvae of benthonic animals. if capable of maintaining themselves near the surface, come near the land, and are in no danger of being lost in deeper water. This condition lasts all the year over, so that periods of reproduction are not subjected to selection pressure. It has been reported in Bermuda that benthic animals reproduce only in the season when there is a convergence around the Island.

The pattern of circulation implies a certain flow of water of relatively high salinity with many plankters flowing outwards over the bottom. The inflow of surface water from offshore to the vicinity of the coast is demonstrated by the presence of Physalia and other indicators. It has been observed occasionally that offshore copepods are found within the bays, an indication that they have been brought from the outside with the current.

(J.G.G.)

ECOLOGY OF SOME SPECIES OF COMMERCIAL MARINE ALGAE OF THE CARIBBEAN

By
M. Díaz Piferrer
Laboratory of Marine Biology, Universidad de Oriente
Santiago de Cuba, Cuba

After four years of research the author presents his own points of view regarding the possibilities in commercializing some of the species of Caribbean marine algae. Investigations were carried out mainly in Cuba, Haiti, Puerto Rico, and the Netherland Antilles. Certain species, such as Ulva lactuca Linneus, Ulva fasciata Delile, Enteromorpha lingulata J. Agardh, Sargassum natans (L) Meyen, Sargassum fluitans Borgesen, Sargassum polyceratium Montagne, Sargassum filipendula C. Agardh, Sargassum platycarpum Montagne, Turbinaria turbinata (L) Kuntze and others, could afford rich sources of raw material for the utilization of seaweeds as supplementary diet in the feed of poultry and cattle, also as a source of vitamins, industrial phycocolloids, food for human consumption and some medical products. It was found that the more abundant Chlorophyceae in the Caribbean were U. lactuca, U. fasciata and Enteromorpha spp. Which grow in association, forming large belts in the tidal zone. Among the Phaeophyceae the pelagic Sargassum (S. natans and S. fluitans) play a very important role. Pelagic Sargassum arrives at the coasts of Cuba in tremendous quantities, but this was not found for Puerto Rico and the other Netherland Antilles, at least in the summer months. The most abundant attached species of brown algae was Sargassum polyceratium, followed in order of abundance by T. turbinata, S. filipendula, S. platycarpum, Zonaria zonalis and some other genera such as Dictyota and Dictyopteris. The author emphasized the need for more investigation and for more experiments in algal-culture using the natural conditions of habitats to increase yield of attached species.

A PRELIMINARY REPORT ON THE SERIOLAS (AMBERJACKS) OF BERMUDA

By
Louis Mowbray
Bermuda Aquarium, Bermuda, B.W.I.

Proper identification of fishes of this branch of the Carangidae has too long been in doubt. The first species of those now included in the genus Seriola was described by Risso in 1810 as Caranx dumerili, from near Italy. Seventeen years later Cuvier designated it as Seriola dumerili. After nearly 150 years there is still doubt as to which of several species is properly called by that specific name. This paper is intended to help in clarification. Detailed descriptions are given for the following species: Seriola islandi (Valenciennes), described from examples of weights 3 1/2 to 26 pounds; Seriola dumerili, from examples with weights 7 1/2 to 40 pounds; and Seriola falcata (C. and V.)-- a specific name that may be synonymous with S. rivoliana (C. and V.)--from examples with weights of 1 1/2 to 6 1/2 pounds. A bibliography is given.

(R. E. C.)

CONTRIBUTION TO THE STUDY OF CUBAN HERMATIPIC SCLERACTINIA

By
Pedro P. Duarte-Bello
Laboratory of Marine Biology, Villanueva University
Marianao, Cuba

Forty six species of Cuban Hermatipic Scleractinia, representing twenty four genera were identified from collections between Playa de Guanabo, Havana Province and Puerto Esperanza, Pinar del Río Province. It is one of the studies conducted at the University of Villanueva to furnish Cuban students with basic knowledge of common marine plants and animals. Scientific descriptions and dichotomous keys are provided in monograph No. 8 of the Laboratorio de Biología Marina, Universidad de Villanueva, Marianao, Cuba.

(L.R.A.)

MASS MORTALITY OF MARINE ANIMALS FOLLOWING TROPICAL RAINSTORMS

By
Ivan M. Goodbody
University College of the West Indies
Mona St. Andrew, Jamaica, B.W.I.

Kingston Harbour, Jamaica is an almost land-locked lagoon about 8 miles long and 1.5 miles wide with a narrow mouth 1.5 miles wide. A river enters at one corner. On two occasions following exceptionally heavy rain a surface layer of low salinity water about 12 inches deep has been recorded. Salinities varied between 12‰ and 20‰, normal harbour water being 35‰. Heavy mortality of animals, particularly sedentary forms occurred at these times. Mortality of fish was observed 3 to 4 weeks after the rains and in one case a heavy concentration of dinoflagellates was recorded at the same time.

(Author's abstract)

SALINITY, TEMPERATURE, AND PLANKTON OF THE WATERS SURROUNDING THE ISLE OF PINES

By
José A. Suárez Caabro
Laboratory of Marine Biology
Universidad de Villanueva, Cuba

A survey of the salinity distribution around the Isle of Pines from January to August 1957, showed that variations were more noticeable over the insular shelf. Average values were higher at stations between the Island and the mainland, Cuba.

Surface temperatures of the water increased normally from January to August, the maximun temperatures being recorded during June, July, and August and the maximun in January and February.

Rainfall was rather high during April and low in January. It was observed that rainfall influenced to some extent the salinity of the shallow water, but not so the oceanic.

Zooplankton was largely composed of copepods which were far more numerous than any other zooplankters. Plankton volumes showed similar variations on the west coast of Isle of Pines. These variations were different from the ones observed at the station occupied at the north side of the island.

(J.G.G.)

PRODUCTIVITY STUDIES IN THE SARGASSO SEA

By
DAVID MENZEL
Bermuda Biological Station
St. George's West, Bermuda B.W.I.

A program to study the productivity and related hydrography of the Sargasso Sea was initiated in late 1957 under contract to the Atomic Energy Commission. The findings to date are of a preliminary nature but reveal certain hitherto unsuspected features. Using the C^{14} method and the chlorophyll-radiation method for measuring productivity, it is apparent that productivity values are low and constant throughout the winter (about .3g C/m^2 /day). In April a marked but very brief flowering occurred with productivity values rising to 2g C/m^2 /day. Again in late April the values returned to .2mg C/m^2/ day and have remained at that constant level throughout the summer.

Zooplankton density increased with the rate of primary productivity and a peak was reached simultaneously. This was contrary to the existing conception that zooplankton production always lags behind increase in phytoplankton production and may perhaps support the contention that in some cases zooplankton cause the reduction in plant matter.

Nitrates appear to limit phytoplankton production - Values of 1.5 ug A/l were recorded in the photosynthetic zone prior to the spring bloom and were reduced to .2ug A/l at the end of the peak in production. Once the zooplankton caused the demise of the phytoplankton population it is felt that the low concentration of nitrate prevented a reoccurence of the bloom.

Apparently the role of nutrient cycles in plant productivity and the occurrence of spring blooms is similar to that which occurs in temperate waters but is of a much shorter duration. Values for productivity appear to fall between the estimates previously given by Steeman Nielsen (1957) and Riley (1957) for the Sargasso Sea.

(Author's abstract)

AN OPTICAL METHOD OF INVESTIGATION OF THE OCEAN: THE P-B DIAGRAM

By
Alexandre Ivanoff
Bermuda Biological Station
St. George's West, Bermuda, B.W.I.

Scattering coefficient increases as total surface of particles in suspension per unit volume of water (β=KS) (Jerlov) and varies with kinds of particles. Although it gives only a rough estimate of amount of suspended matter its measurement is useful in study of variations in amount of suspended matter and in detecting local accumulations of particles--possibly, also in distinguishing water masses. Far from land, confusion arises from productivity in the photic zone and products of disintegration below. Optical methods are, then, only an additional tool with the classical temperature-salinity diagram, but are useful since measurements are made immediately on board. A new method is described, with a specially designed apparatus, which measures simultaneously scattering coefficient and degree of polarization. Degree of polarization does not vary with concentration of particles (within, at least, an important range), but decreases with mean diameter of particles. Polarization varies with shape of particles; both polarization and scatter vary with kind of particles; nevertheless, knowledge of both is more useful than knowledge of scatter alone. Diagrams shown were records of results obtained in coastal waters of Bermuda, in Harrington Sound, in deep water of the Mediterranean, and in deep water south of Bermuda. Measurements in deep water are more interesting and more delicate. Those made south of Bermuda were less stisfactory, because the small vessel made measurements on board impracticable; observations in the laboratory on water samples several hours old. with matter in suspension changed, are less reliable. Knowledge of both β and ρ, measured quickly on board, increases the reliability of optical methods of distinguishing water masses.

(R.E.C.)

SUCCESSION AND COMPOSITION OF THE THALASSIA COMMUNITY

By

Ramón Margalef
Institute of Fisheries Research, Barcelona, Spain and Institute of Marine Biology, University of Puerto Rico

and

Juan A. Rivero
Institute of Marine Biology, University of Puerto Rico

Thalassia testudinum is the most common phanerogam in the shallow, well illuminated and well protected areas of La Parguera. It reacts indifferently to the substrate, growing in coarse sand as well as in mud. Previous stages in the succession tend, however, to homogenize the substratum, and the end or climax community is usually characterized by a uniform substratum, no matter the stages through which it has passed.

The total biomass of the Thalassia community has been determined by the method of pigment extraction, and as a means of reference, the amount of pigment in different sections

of the leaves has also been estimated. As in plankton, where the greatest power output is manifested by a low D_{430}/D_{665} ratio, such as is the case with Thalassia, where the ratio decreases towards the younger whitish sections of the leaf.

Chlorophyll content and D_{430}/D_{665} index for other species sometimes associated with Thalassia are as follows:

Table 1

	Chlorophyl a Parts/thousand of biomass	D_{430}/D_{665} ratio
Penicillus capitatus (Chlorophyceae)	1.8	1.69
Halimeda opuntia (Chlorophyceae)	.27*	1.81
Dictyota cervicornis (Phaeophyceae)	1	2.52

*Referred to total dry weight. Halimeda contains too much calcium carbonate.

The end Thalassia community may come to being by passing through different serial stages, depending on the type of substratum (sand, mud, rock, Porites coral) where it is initiated. However, when the climax community is reached, the composition of the different series becomes more uniform, although, as the following table demostrates, some differences are always maintained. Diversity may show up again during the various regressions caused by denudation of the bottom.

Table 2

Samples *	Coarse substrate; Halimeda series			More muddy substrate; Penicillus series			
	1	2	3	4	5	6	7
Thalassia testudinum							
weight leaves**	220	216	164	215	182	157	150
weight rhizomes	892	850	1170	28	329	395	440
% chlorophyll in leaves	0.14	.012	0.1	.09	0.4	0.1	?
D430/665 ratio	2.31	2.33	2.44	--	2.0	2.23	2.23
rhizome/leaf ratio***	4.05	3.97	7.14	1.35	1.81	2.52	2.83
Halimeda and Corallinaceae dry weight	405	815	425	17	--	110	--

*Estimates based on areas $1/4\ m^2$. Weight estimated for material dried to constant weight at a temperature of 110°- 120°C.

**Weight and biomass expressed in gms. of dry weight per m^2.

***First noticed by Burkholder et al.

The biomass of the Thalassia association is small; approximately of the order of 20 gms. of dry weight per m^2. Even if the total biomass were not renewed more often than once a year, productivity would be of the order of 2 gm. of C per m^2. Probabilities are that it is several times that much, and thus not less than in the coral reef. Utilization of Thalassia by other trophic levels appears, however, to be more deficient. It appears that a good proportion of the vegetable substance is decomposed without being utilized by animals. Besides Lytechinus which may be important in some areas, the main consumers of marine phanerogams are animals of terrestrial lineage: the sea turtle (Caretta, Chelonia) and the manatee. As these species become scarcer, due to man's action, their mission in the trophic structure of Thalassia becomes less and less important, and more of the phanerogam is left inutilized.

J.A.R.

EXPERIMENTS ON THE SHOALING BEHAVIOUR OF FISH

By
D.M. Steven
University College of the West Indies, St. Andrew, Jamaica

Hepsitia stipes and Bathystoma rimator are two common species of small fish found in shoals in inshore waters of the Caribbean. Two or more fish in an aquarium form a shoal. During the day the fish remain near the bottom of the tank in a tight shoal, mostly oriented in one direction, and swim rather slowly. At night they are more active and the shoals are dispersed, the fish moving freely and individually in all directions and at all depths. There is no sudden switch from the day to the night pattern of behaviour. As the light diminishes they become increasingly active, and swim further apart. At illuminations of less than 0.1 foot candles the shoals break up, at first for a second or two, but progessively for longer periods and into smaller and smaller groups. Shoals are reformed in darkness following a shock. They are reformed also if the tank is illuminated from overhead, but may disperse again after several minutes of continued illumination.

Shoals of approximately equal size take little notice of one another, their movements and orientation in two adjacent tanks being independent. If two or three fish are placed in one tank and about ten in other, the small shoal orients its movements closely with the larger one. A single fish in one tank spends most of its time trying to swim through the glass to join the shoal in the other.

Feeding behaviour may be initiated by visual or olfactory stimuli. Live plankton introduced into the tank in a closed vessel is repeatedly attacked. Injection of seawater in which plankton has been kept for a few minutes or small quantities of cell-free extracts of clam meat bring about a characteristic exploratory feeding reaction by day or night. When so activated fish will pick up and swallow pieces of filter paper lying on the bottom of the tank.

Activating substances are present in the dialysable fraction of seawater extracts of fresh clam muscle, and also in fresh hot seawater extracts. The fish can detect and respond by a change in behaviour to small differences of water temperature and salinity and to a wide variety of substances injected into the tank in trace amounts. Glucose, sucrose, lactic acid, trimethylamine, diphenylamine, glutamine, glycine, creatine and histamine were detected but did not elicit exploratory feeding behaviour. Ammonia, lactic acid and creatinine did on several occasions stimulate the characteristic feeding reaction.

(Author's abstract)

THE GREAT BAHAMA BANK

By
Norman D. Newell
American Museum of Natural History, and Columbia University, New York, N.Y.

The Great Bahama Bank is the largest of several shallow, dish-shaped limestone platforms partly filled with calcareous sediments. These materials do not release nutrient salts on weathering. The general ecological setting of the region is remindful of large oceanic atolls, and the sparseness of fauna and flora over the Bank interior reflects general low productivity.

In additon to the usual ecological field observations on depth, temperature, chlorinity, etc., the survey has featured geological mapping of the substrate as an aid to an understanding of the regional distributions of organisms. The physical form and constitution of the Bank provide valuable clues about prevailing processes.

The most outstanding benefit of the geologic mapping has been the discovery that substrate character and to some extent, community distributions, have been directly controlled by three interacting factors: 1) hydrography (depth and topography), 2) isolation from a source of terrigenous materials and fresh water streams, 3) energy gradients from prevailing winds and tidal currents.

A half-dozen bottom types were differentiated and mapped over 40,000 square miles. Then, the bottom communities were independently differentiated and mapped. The two display similar distributional patterns but there are no noteworthy differences. The communities are influenced by salinity gradients and factors other than substrate type. Probably, the energy gradients operate in many cases as the one independent, or causal, variate.

The geologic approach to the ecology of a region necessarily involves a search for clues about the local history of environmental and biogeographical changes. An examination of the coral reefs of the West Indies in general, and the Bahamas in particular, shows that they are superficial structures that differ in many respects from Indo-Pacific reefs. Zonal comparisons of reefs of the two provinces show homologies. The differences, chiefly topographic in character, are interpreted as due to the extreme youth of the West Indian reefs.

There is much geologic evidence, however, that basically, the Bahama Banks, the Florida Peninsula, and many other limestone platforms of the West Indies were formed during the Cretaceous and Tertiary periods as barrier reefs and lagoon deposits. For example, the entire continental shelf from about Savannah, Georgia, to the Greater Antilles, is composed of a vast thickness, nearly 3 miles of shallow-water limestone that has been slowly sinking since the Jurassic period. The shelf edge is similar topographically to the great reef scarpments of the Pacific.

West Indian reefs, unlike those of the tropical Indo-Pacific, were destroyed by each of the several glacial stages and they were deeply eroded by the fluctuating margin of the Pleistocene sea. Warming of the northern part of the West Indian province after the last retreat of the continental glaciers has resulted in reestablishment of the tropical biota in the Bahamas and Bermuda within the past few thousand years, probably not more than 2,000–3,000 and certainly not more than 5,000 years ago.

(Author's abstract)

DISTRIBUTIONAL PATTERNS OF THE MARINE COPEPODS OF THE SOUTHWEST COAST OF PUERTO RICO

By

Juan Gerardo González and R. E. Coker
Institute of Marine Biology, University of Puerto Rico

Because of the wide distribution of the Copepoda and the special conditions of the region of La Parguera, a study of the local pattern of distribution seemed desiderable.

Practically all the species that have been found here are also found in the Gulf of Mexico as shown by previous work by one of the authors in Gulf waters. However, so far it appears that there are more species in the Gulf than in waters off southwestern Puerto Rico. This is to be expected because the area covered in the Gulf waters is greater and has been studied for a considerable period of time; the studies there included, also, bathypelagic species. The species that we have found in our offshore waters are common to Gulf offshore copepods. A like statement can be made as to most of the copepods of the two regions.

Of the species collected here, Oithona minuta, Oithona simplex, Acartia tonsa, and Euterpina acutifrons are consistent in samples from the bays. A. tonsa and O. minuta

are fairly abundant and seem to breed throghout the year. Acartia spinata, Acartia lilljeborgi, Centropages furcatus, Tortanus discaudatus, Paracalanus parvus, and Clausocalanus furcatus are common within the area. Temora turbinata has been found in the bays, but T. stylifera only in offshore waters.

Calanus minor, Undinula vulgaris, Eucalanus subtenuis, Eucalanus pileatus, Euchaeta marina?, Labidocera nerii, Labidocera scotti, Pontella mimocerami, Microsetella norvegica, Sapphirina sp., Oithona plumifera, Corycella carinata, Miracia efferata, and Copilia mirabilis have been found commonly in offshore waters (the region where these samples were obtained was in closer contact with Caribbean and Mona Passage waters). Metis jousseaumei has been found rather commonly in very shallow waters, particulary if the bottom is covered with Thalassia. Oithona simplex, Tisbe longicornis, and Pseudocyclops spp. have appeared infrequently in the Canal de Magueyes. Laophonte cornuta is very uncommon, however, it has been obtained from deep collections and right over mud samples.

It is interesting to note that occasionally, offshore copepods have been observed within the bays or close to them; probably an indication that they move in with surface water coming from offshore.

(J.G.G.)

THE FOLLOWING PAPERS WERE NOT INCLUDED IN THE PROGRAM, BUT WERE CIRCULATED TO THE CONFEREES

CHLOROPHYLL A IN SOME CORALS AND MARINE PLANTS

By
Paul R. Burkholder, Lillian M. Burkholder and Juan A. Rivero
Brooklyn Botanic Garden and Institute of Marine Biology,
University of Puerto Rico

The chlorophyll a contents of 28 kinds of marine animals and 20 different plants of Puerto Rico were determined in acetone extracts by use of the Beckman spectrophotometer and the formulae of Richards with Thompson. Many corals and anemones were found to contain chlorophyll a in amounts comparable to algae and marine flowering plants. Gorgonian corals and anemones possess very abundant populations of zooxanthellae and show the highest concentrations of photosynthetic pigment among the species of animals which were studied. The ecological significance of the photosynthetic system present in the algal associates of coral reef animals deserves adequate study.

(J.A.R.)

THALASSIA IN PUERTO RICO

By
Paul R. Burkholder, Lillian M. Burkholder and Juan A. Rivero
Brooklyn Botanical Garden and Institute of Marine Biology,
University of Puerto Rico

Thalassia, the turtle grass, is abundant in the shallow waters of Puerto Rico and other tropical areas. The standing crop of this "grass" ranges up to about 33 tons per acre. It provides shelter for many species of animals and contains large amounts of basic foodstuffs in the form of proteins and carbohydrates.

The quantitative distribution of marine bacteria, adjancent to and in beds of Thalassia, was studied in a channel lying between Magueyes Island and the mainland near La Parguera. Samples were collected in bottles, and dilution pour plates were prepared in Difco nutrient agar made with sea water. The number of colonies that developed aerobically after 48 hours was taken to indicate the quantitative accurrence of bacteria in different samples. Typical results, indicated that comparatively large numbers of bacteria are present in the mud and on the leaves of Thalassia.

Thirty-five bacterial isolates obtained from marine mud and water in the region of La Parguera were tested for their ability to grow in sea water containing soluble material extracted from Thalassia, in the amount of 4.1 mg. of dry extractives per ml. of medium.

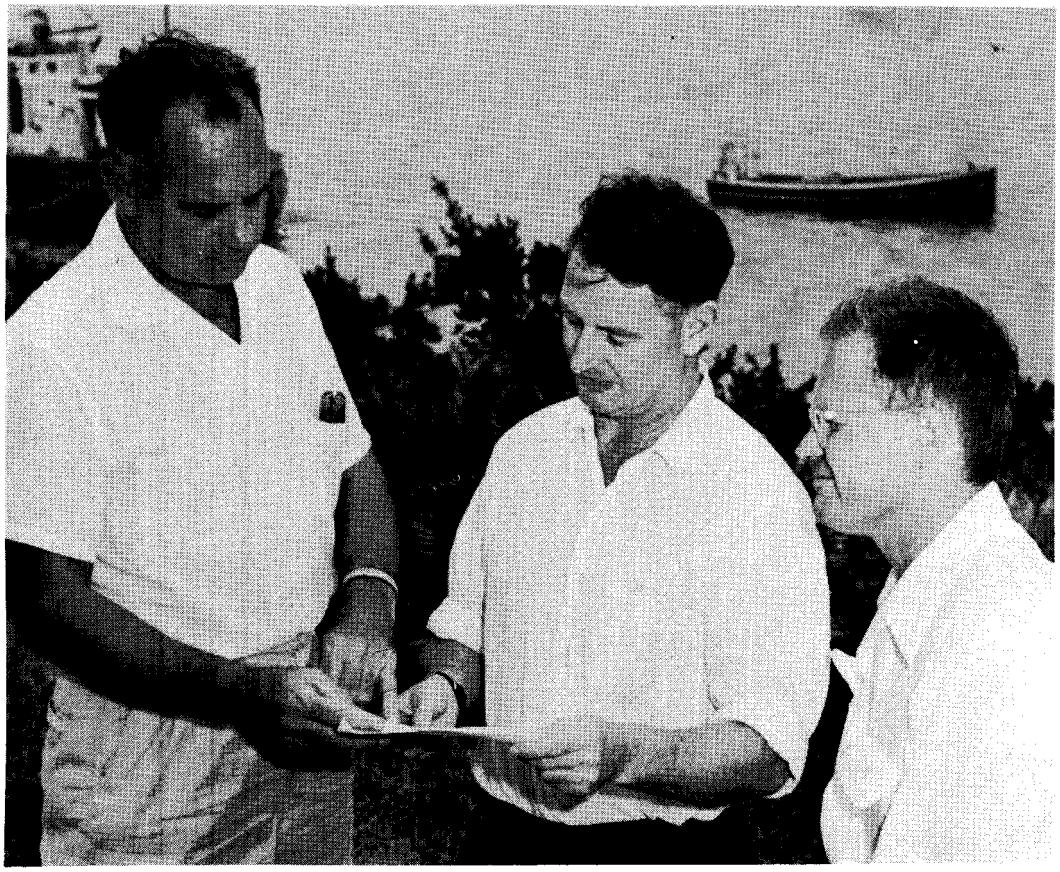
Among these isolates, 10 grew very well, 18 made fair growth, and seven failed to show any growth.

Four of the cultures which grew well on grass extract medium were grown again for 24 hours in sea water Thalassia leaf extract broth, containing 9.7 mg. of grass solubles per ml. The bacteria were then separated on millipore filters, dried and weighed. Calculations show that from 14 to 23 percent of the organic extract from Thalassia leaves was converted to bacterial dry matter.

Studies on microbial decomposition of macerated Thalassia leaves indicated that very large populations of bacteria soon developed, and that these were promptly followed by tremendous growths of ciliated Protozoa. It seems probable that many predatory animals, which live in the Thalassia beds, may be feeding upon microbial populations which are supported by constituents of the grass. Studies on the stomach contents of balahoo fishes, Hemiramphus brasiliensis, showed their main food to be leaves of Thalassia and some plankton.

(J.A.R.)

Members of the A. I. M. L. outline a cooperative project.



A group of members discussing some interesting problems.