IABO

Proceedings

Vol.2, 1973

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
DIVISION OF ENVIRONMENTAL BIOLOGY

CONTENTS

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
DIVISION OF ENVIRONMENTAL BIOLOGY

PROCEEDINGS
OF THE

INTERNATIONAL ASSOCIATION FOR

BIOLOGICAL OCEANOGRAPHY

Volume 2

1 June 1973
Copenhagen, Denmark

1. REPORT ON THE INTERNATIONAL ASSOCIATION FOR BIOLOCAL OCEANOGRAPHY 1970/73

1.1 Membership

lABO's contacts with biological oceanographers have grown considerably. Formal contacts exist at present with the following countries: Algeria, Argentina, Australia, Brasil, Canada, Chile, Denmark, Finland, France, Germany (FRG), Germany (GDR), Greece, Iceland, India, Ireland, Israel, Italy, Japan. Mexico, Monaco, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Union of Soviet Socialist Republics, United Arab Republic, United Kingdom, United States of America.

In each of the countries one or more National Correspondents were nominated. Their duties are as follows: 1) Disseminate information from IABO to institutions and/or individual biologists of their home country; 2) bring to the attention of IABO suggestions from institutions and/ or individual biologists in their home country regarding meetings, publications, etc. , which may serve to strengthen international relationships in marine biological sciences; 3) bring to the attention of IABO any exciting new or major developments in the subject, in their country, which they feel may be of interest to biologists elsewhere.

1. 2 Meetings

Second General Meeting. During the International Oceanographic Assembly in Tokyo the Second General Meeting of IABO was held on 21 September 1970. Scientists from 20 countries as well as representatives of international organizations were present. A report by the President was published in IABO Proceedings, vol.1: 11-15.

The following were elected officers for the period between the Second and Third General Meetings: G. Hempel. Germany (President); T. Wolff, Denmark (Secretary); R. Marumo, Japan; R.C. Dugdale, USA; P.A. Moiseev, USSR; R.I. Currie, UK (Past President); M. Ruivo. ACMRR1^ (ex officio). Later on Dr. M. J. Dunbar, IBP/PM. was appointed ex officio member of the IABO Executive Committee, and Dr. C.E. Lucas, UK, agreed to act as adviser on fishery biology.

Executive Meetings. Members of the Executive Committee met in Kiel 5 April 1971 and 1 July 1972. in Copenhagen 11 January 1972, and in Edinburgh 20 September 1972. In between the President and Secretary met on various occasions to discuss current activities of IABO.

1.3 Proceedings

The first issue of the Proceedings of IABO was published on 1 September 1971. Besides reports by the President and Secretary it contains a historical account of the establishment of IABO, a list of National Correspondents and their condensed reports on recent activities in the field of biological oceanography in their home countries. The Proceedings also informed on current and future international activities and events. Substantial support for publication of the Proceedings was received from SCOR.

1. 4 Working Groups

In cooperation with and partly on the initiative of IABO, several biological and related Working Groups were created by SCOR. Their activities were reviewed by the SCOR Executive at 8 months' intervals. The President and Secretary attended the meetings of the SCOR Executive.

A status report on the biologically oriented Working Groups of SCOR and ACMRR is given on p. 9.

1. 5 Symposia

IABO was represented and took active part in the following marine symposia:
International Oceanographic Assembly, Tokyo, 13-25 September 1970. It consisted of 3 General Symposia and 4 Special Symposia which were directly related to biological oceanography:

Man's Intervention in the Sea
The Benthic Boundary
Environmental Data and Forecasting for Fisheries
Nutrient Limitations and the Nitrogen Cycle
Life in the Deep-Sea
Vertical Structure of Ecosystems
Sedimentation of Marine Organisms

[p. 3]
One session was specially devoted to contributed papers which were reviewed by four experts under the following general headings:

Distribution of Plankton
Distribution of Benthos and Nekton
Productivity and Feeding
Cultivation and Growth

For details see IABO Proceedings 1:20-22.

The Proceedings of the Joint Oceanographic Assembly, entitled "Ocean World" were published in December 1971 in Japan. It includes a report of the Japanese Organizing Committee, brief reports of Business Meetings, discussion of a proposal for an "International Union of Marine Sciences", speeches of the Opening and Closing Ceremonies (including Summary Lectures) and abstracts of Invited and Contributed Papers.

Symposium on the Biology of the Indian Ocean, Kiel, 31 March-6 April 1971. For details see IABO Proceedings 1: 22. The proceedings are published under the title "The Biology of the Indian Ocean" (B. Zeitzschel) by Springer Verlag, Berlin-Heidelberg.

International Sea-Weed Research Symposium, Sapporo, 9-13 August 1971. A report is given on p.12.

Symposium on Productivity of the Pacific Ocean, Canberra, 18-27 August 1971. A report is given on p 13

XIIth Meeting of the Scientific Committee on Antarctic Research (SCAR), Canberra, 14-19 August 1972.A report is given on pp 17-18.

At present IABO along with ACMRR/FAO, ICES, ICNAF and SCOR is engaged in an international symposium on the Early Life History of Fish, at Oban (Scotland), 17-23 May 1973. While FAO has published preprints of the abstracts, ICES has agreed to publish the proceedings of the Symposium in its Rapp.proc. Verb. Financial contributions to the printing costs are expected from ICNAF.

1. 6 Other Activities

The President served as *ex-officio* member of the Executive on the Scientific Committee on Oceanic Research where he also represented IUBS. Furthermore he participated in meetings of
the Intergovernmental Oceanographic Commission (IOC), the International Council for the Exploration of the Sea (ICES), the Advisory Committee on Marine Resources Research (ACMRR) of FAO.

Discussions have been held on the following themes which may be the subjects of future Working Groups of Symposia: Microdistribution of marine organisms; Biological indicators of water masses, of pollution and of climatic changes; Taxonomy with electron microscopy; Productivity of mangroves and other sheltered warm water habitats; Chemical factors influencing phytoplankton production; Methodology of phytoplankton counting; Quantitative estimation of micronekton; Long-term changes in fish populations in relation to changes in the environment.

G. Hempel / T. Wolff

1) List of abbreviations on page 3 of the cover.

2. INCOME AND EXPENDITURE ACCOUNT OF IABO
1 September 1970 to January 1973

Income		Expenditure	
1970 Brought forward	£1153 00 0	1970 Paid to SCOR for Travel Expenses to "Ocean World", Tokyo ($1500)	£630 14 10
Bank Interest (30 Sept.)	55 14 9	Paid to SMBA for President's Travel to Tokyo ($500)	£210 00 00
		Secretarial Expenses	£ 8 19 08
		Balance	£359 00 03
As at 1 12 1970	£1208 14 9	As at 1 12 1970	£1208 14 09
1971 Brought forward (£ 359 00 03)		1971 Postages	£ 7.20
Decimal conversion	£359.02	Bank Charge	0.75
Grant from IUBS for Kiel IIOE Symposium $1000		Paid to SCOR for Travel to Kiel Symposium $1000	
Bank Interest	£14.69	Publication of IABO Proceedings D.kr.4597,47	£254.67
		Bank charge	0.62
		Balance	£110.47
As at 1 December 1971	£373.71	Total	£373.71
1972 Brought forward	£110.47	1972 14 Apr. Postage 230 D.kr.	£ 12.63
IUBS Grant $ 500	£189.89	Charges	0.37
Bank Interest (30 Sept.)	5.67	21 Jul. Secretary travel to Kiel, 390 D.kr	£ 22.94
Bank Interest (11 Jan. 1973)	1.98	Charges	0.37
		29 Sep. Postage SMBA	£ 19.52
		18 Oct. Secretary Travel to Oban (SCOR)	£ 72.20
		Charges	0.54
		Balance	£179.44
As at 11 January 1973	£ 308.01	Total.	£308.01

Balance transferred to Denmark - £179. 44 minus account transfer costs: D.kr. 2898,47

(Signed) Ronald I. Currie, Past President
Dunstaffnage Marine Research Laboratory
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Audited and found correct:

(Signed) W.H. Gillebertus, Administrative of
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3.0 REPORT ON IABO EXECUTIVE MEETING IN EDINBURGH

At the 2nd International Congress on The History of Oceanography which took place in connection with the Challenger Centenary in Edinburgh, a IABO Executive Meeting was held on 20 September 1972. It was attended by G. Hempel, R.I. Currie, M. Ruivo, C.E. Lucas. T. Wolff and two National Correspondents, J.H. Day (South Africa) and D.E. Hurley (New Zealand).

The items were:

3. 1 The role of IABO in furthering communication between marine biologists IABO is playing an increasing role in serving as an advisory body and in initiating the establishment of symposia, working groups, etc. So it is all the more important to carefully select topics and meeting procedures which have a great impact on the development of biological oceanography. The provision of funds, however, for participation in scientific meetings is getting more and more difficult on an international and often also a national level. In planning scientific gatherings it was recognized that IABO should meet the interests of two groups of people:
(1) Those involved in highly developed research using complicated methods and often expensive apparatus.
(2) Those using a much less advanced technology, i.e. trying to do modern work with simple means, mainly studying local phenomena and working in rather small laboratories, particularly attached to universities.

It was considered for those representing group (2) to be given the opportunity of presenting their work put for discussion on an international stage and to become involved with those mainly representing group (1).

The following fields were identified as possible themes for future activities:

3.1.1 Productivity of mangrove and other sheltered warm water habitats. This item was pro-posed and accepted as being one in which a considerable number of representatives of group 2 were interested. It was emphasized that the topic should be kept rather narrow and restricted to tropical areas.

3.1.2 Chemical factors influencing phytoplankton. Recent work, mainly on the kinetics of nutrient limitation, has indicated a need to revise classical concepts and pay attention to the intra-cellular concentration of nutrient as well as the concentration in the medium. In view of the very widespread interest there is in the nutritional potential of the sea for phytoplankton and the large amount of effort devoted to nutrient estimation, it was considered that National Correspondents should canvass views on the desirability of holding a discussion on this topic in the near future.

3.1.3 Dynamics of Marine Ecosystems. This subject has been discussed by correspondence amongst a group of 13 specialists. It was agreed that a first step in promoting this activity would be to set up an ACMRR-IABO group on the application of modern quantitative ecology to the management of living marine resources and their environment.

3.1.4 Microdistribution of Marine Organisms. It was found that it might still be premature to establish a working group on this matter, but that discussions and correspondence should be continued.

3.1.5 Other proposals. The limited means available require the establishment of priorities. Therefore the proposal for a symposium on the use of electron-microscopy for identification of marine organisms was declined for the time being. The same holds good for a symposium on indicator species and communities for identification of water masses, pollution and climatic

changes, which are themes of various working groups and seminars under preparation by SCOR and ACMRR.

T. Wolff

4. REPORT ON IUBS EXECUTIVE MEETING IN VIENNA

The President of IABO attended the Executive Meeting of IUBS on 21st October 1972 in Vienna. Major topics of the discussion were the allocation of funds for the budgetary year 1973 to the various activities of the Union for Biological Sciences, the role of IUBS in strengthening biology in developing countries, the preparation of the General Assembly of IUBS in Norway, early October 1973, and the first International Congress on Ecology, The Hague, September 1974. In the discussion it became obvious that the marine activities under IABO are a rather strong element of IUBS. Particularly the interdisciplinary relations through SCOR and the attention paid to applied biological oceanography with its links to FAO and the various international groups concentrating on pollution problems were repeatedly mentioned. Activities , related to applied biology, are in general of particular importance to developing countries and there again IABO may play an important role within the framework of the activities of IUBS. On the other hand IABO may profitably collaborate with other Associations of pure science under IUBS, e.g. in taxonomy and comparative ecology. IUBS agreed to subsidize the administrative activities of IABO as well as the participation of about three scientists at the Symposium on the Early Life History of Fish.

G. Hempel

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6. STATUS REPORT ON BIOLOGICALLY ORIENTATED WORKING GROUPS

A. Recently discharged SCOR groups

WG 15: Photosynthetic Radiant Energy. Chairman: J. E. Tyier, USA. The last meeting was held in Copenhagen 23-24 June 1972.The final recommendations of the group are still being discussed. The Chairman is compiling the data report of the "Discoverer" Expedition; it will contain sections on the methods used, data from all measurements on each station and the evaluation of radiometric data from the calibration experiment. The results in the form of scientific papers will be published in appropriate journals.

WG 23: Zooplankton Laboratory Methods. Chairman: V.Kr. Hansen, Thailand. The final meeting was held at Bath, England in July 1972 in conjunction with the Symposium on Fixation and Preservation of Marine Plankton (see p. 16). Drs. Steedman, K.W. Petersen, Vagn Hansen and Beers are serving as editors of the manual, "Laboratory Methods in the Study of Marine Zooplankton, and arrangements are being made for its publication by UNESCO. In addition, it is intended to prepare a shorter report with the major findings and recommendations to be published in a marine journal to secure a prompt and widespread distribution.
UNESCO have agreed that the Panel for International Marine Biology Centres will assume responsibility for overseeing the long-term experiments initiated by the group (see SCOR Proc. 6^,2: 88-89).

WG 24: Estimation of Primary Production under Special Conditions. Chairman: T. Parsons, Canada. The final report is published in the UNESCO series "Monographs on Oceanographic Methodology" (obtainable from UNESCO, Paris VII® or through booksellers, 8 FFr.).

WG 29: Monitoring in Biological Oceanography. Chairman: A. Longhurst, UK. The final meeting was held in Plymouth in March 1972.The report is completed and UNESCO has made provision for publishing the report in its technical papers in Marine Science series. FAO has sought approval to translate it into French and Spanish. Members of the group (A. Longhurst, M. Colebrook, J. Gulland, R. Ie Brasseur, C. Lorensen and P. Smith) published a paper on some aspects of their discussions: "The instability of ocean populations". New Scientist, 1 June 1972: 500-502. A preprint of the report was produced by the Chairman.

WG 33: Phytoplankton Methods. Chairman: K.Banse, USA. The final report is being edited for publication in the UNESCO technical series on marine science. SCOR/IABO is considering the

need for establishing a working group on preservation methods for phytoplankton. Plans are being developed for a workshop on phytoplankton counting and for the preparation of a Manual.

WG 39: Scientific Investigation of Pollution in the Marine Environment. Chairman: A. J. Lee, UK. A report of the meeting in San Marco di Castellabate and Rome in October 1971 was printed by FAO (FAO Fish. Rep. No. 112) and a summary of the report was given in SCOR Proc.

8. 1, Annex
VIII. The recommendation of the group led to the establishment, by IOC, of the Global Investigation of Pollution of the Marine Environment (GIPME) as a major project of LEPOR.
B. SCOR groups to be continued

WG 32: Biological Data Inventories (with ACMRR).
Terms_of Reference,: To assist organizations concerned with marine biological data inventories and information retrieval in national, regional and world data centers; to prepare definitive specifications for second level inventories and to propose means for their implementation.
Memb_ers_ (nominated by SCOR): J. M. Colebrook, UK (Chairman); G. Hempel, FRG; (nominated by ACMRR): B. Zeitzschel, FRG; S. Saila, USA; ex officio: A. R. Picciolo. WDC-A; E. Akyuz, FAO. The group met in Edinburgh on 12-14 June 1972. Proposals for revision of the ROSCOP form produced by the Data Exchange (IODE) Task Team on International Exchange of Marine Biological Data and WDC-A Oceanography were considered; these were subsequently submitted to these bodies. In reviewing the work of the ROSCOP inventory and the activities of the IODE Task Team the group concluded that there was a need to supplement the proposed systems with an international inventory of the holdings, by institutes, agencies and individual workers, of developed data and results from field investigations in biological oceanography and marine pollution (see SCOR Proc. 8, 2, Annex VIII for details). The group will prepare a definitive specification for the second-level inventory (tentatively called ROMBI - Results of Marine Biological Investigations) and propose means for its implementation.

WG 35: Methods in Quantitative Ecology of Coral Reefs.
Terms_qf_Reference: To identify the major scientific problems in the quantitative ecology of coral reefs; to evaluate and test existing methods for the quantitative description of abundance, composition and distribution of benthic invertebrate communities on reefs; to recommend standard field techniques suitable for the problems identified under the first term; to consider the need for a future symposium on the quantitative ecology and productivity of coral reefs.
Members: D.R. Stoddart, UK (Chairman); F.H. Talbot, Australia; M. Pichon, France; R.E. Johannes. USA"; G. Scheer, FRG; Y. Loya, Israel; K. Konishi, Japan.

A series of position papers were prepared by members of the group, with the intention of working out a handbook of methods and a dictionary of reef terminology. The group will meet at Heron Island in conjunction with the Second International Symposium on Coral Reefs in June 1973.

WG 36: Coastal Upwelling Processes (with ACMRR and ACOMR). Terms of_Reference: To review present knowledge of the physical, chemical and biological processes involved in coastal upwelling; to evaluate strategies for the investigation of these processes and recommend appropriate investigations; to examine the application of these recommendations in the up-welling region off North-west Africa.

Chairman: K. N. Fedorov. USSR. Members, of biologic al_panel (nominated by ACMRR): R. Dugdale, USA (Chairman); D.H. Cushing, UK; R. Margalef, Spain; '(nominated by SCOR): G. Hempel, FRG; H. Minas, France; Y.I. Sorokin, USSR; D. Nehring, GDR.

Work was initiated by correspondence. The first meeting (for both panels – biological and physical) took place at Corvallis, USA, 27-29 March 1973. The report of the meeting contains a review of the present state of research on coastal upwelling off Oregon-California, Peru and North-west Africa. The report will be published in SCOR Proceedings S, 3. Proposals for joint studies shall be developed before and at the second meeting of WG 36 in Kiel, FRG, June 1974.

WG 37: Marine Plankton and Sediments. Terms_of_Reference: To discuss the principles of systematics, stratigraphy and environmental interpretation of planktonic remains in marine sediments, including biological remains in varved sediments as indicators of recent ocean conditions; to compare submarine stratigraphy with that on land; to prepare a symposium on these topics.
Members,: E. Seibold, FRG (Chairman); H. Bolli, Switzerland; B. M. Funnell, UK; W. Riedel, USA; Y. Takanayagi, Japan; A. P. Jouse, USSR; A. Be, USA.
The group held its first meeting in Montreal. 31 August - 1 September 1972. Planning was initiated for the symposium to be held in Kiel in September 1974 (see SCOR Proc. 8, 2, Annex IX). A symposium volume of 300-400 pages is planned, containing invited papers, importanlTcomments on the invited papers, and group summaries.

WG 40: Paleo-Oceanography.
ToR. To review and coordinate study of the geological time-scale evolution of oceanic circulation, climate and chemistry in relation to sedimentological, geochemical and paleontological evidence from marine sediments and to investigate procedures for promoting interdisciplinary and international cooperation in this field. Chairman: T. van Andel, USA; other members to be determined. The first meeting will be held at Norwich, 16-23 May 1973.

WG 42: Baltic Pollution (with ICES).
ToR. (a) To identify from the point of view of pollution the need for further basic hydrographical, biological, biochemical and biogeochemical studies; (b) to coordinate appropriate surveys of the open Baltic, making use of existing groups of experts whenever possible; (c) to coordinate and develop programs for biological monitoring stations with such indicators of changes in the environment as, (I) benthic microorganisms, (II) benthic macro-flora and fauna, (III) plankton; (d) to develop plans for coordination of the studies of the level of toxic substances in food fish and the marine environment; (e) to cooperate with the corresponding North Sea Group in shipboard and laboratory intercalibration tests of sampling, storage and analysis methodology for toxic substances; (f) to develop a scheme for continuous collection and analysis of all pertinent information on input of pollutants into the Baltic Sea and on the changes in its degree of stagnation brought about by organic waste. Members_ (nominated by SCOR): I. Hela, Finland (Chairman); H.J. Brosin, GDR; A. Aitsam, USSR; E. Dahl, Sweden; C.H. Mortimer, USA. Other members are nominated by participating ICES members.
The group held its first meeting in Lund, Sweden, 2-4 May 1972. An extended report was prepared by ICES (C.M. 1972/E:10, Fisheries Improvement Committee) and a summary report was given in SCOR Proc. S, 2: 61.
A final report was drafted by an ad hoc group consisting of I. Hela (Chairman), S. Fonselius, B. Bolin, B.O. Jansson and G. Hempel. The report contains a review of the scientific problems related to pollution of the Baltic, focussing on modelling of the Baltic ecosystems as a basis for

understanding man's interaction in the ecosystem. A plan for action identifies five fields of research (exchange of water nutrients and other dissolved matter with the North Sea; coastal waters dynamics; Open sea multidisciplinary continuous stations; year-round biological stations; and determination of toxic substances). Most of the work shall be started or carried out in 1975 during a proposed "International Year of Baltic Pollution Research". The Working Group will discuss the draft report and the suggestions for Joint research at its meeting in Kiel, FRG, 28-29 June 1973.

C. Recently established SCOR groups

WG 44: Tropospheric Transport of Pollutants (with ACOMR and IAMAP).
Terms of Reference: To evaluate the problems involved in studying the transport of inorganic particles and gases through the troposphere and their transfer to the ocean, including the development of suitable sampling and analytical methods and to consider means for promoting their investigation. A group on this topic was suggested by WG 39.
Membership not yet finalized.
WG 45: Marine Pollution Research. Terms of Reference: To review the marine pollution research activities of international scientific organizations; to consider ways to promote and encourage such research and to improve its coordination, including the more effective exchange of pertinent information. Members_: G. F. Humphrey, Australia (Chairman); A.J. Lee (ICES); A.R. Longhurst (ACMRR); M. Waldichuck (GESAMP); ACOMR and ECOR have not yet named representatives.
The first meeting was held in connection with the GIPME meeting in London, 30 March 1973.

WG 46: River Input to Ocean Systems (with ECOR, IASH, ACMRR and UNESCO). Terms of Reference: To review present knowledge of the transport of water and of dissolved and suspended substances front rivers to the ocean and the subsequent fates of these substances; to evaluate present methods and arrangements for monitoring these inputs, including those regarded as significant marine pollutants. Membership not yet finalized.

Both WG 39 and the Marine Geoscience Workshop had recognized the importance of this topic; at the suggestion of SCOR. the IOC Secretariat had taken initial steps to gather information on national and international programs of river discharge study and measurement, including the monitoring of riverborne pollutants.

D. IABO/ACMRR Working Parties

Marine Aquaculture. Terms of Reference:(a) to review the recommendations of recent meetings pertinent to aquaculture, particularly those of the IOC/GELTSPAP (November 1970) meeting and the FAO Technical Conference on Marine Pollution and its Effects on Living Resources and Fishing (December 1970), and assist FAO and the other organizations concerned in designing regional and international research programmes on aquaculture in the estuarine and marine environments, and their application to national development programmes; (b) to provide, together with other groups concerned with these problems, guidance to FAO in the preparations for the proposed FAO Technical Conference on Aquaculture. Members: C. Idyll, USA (Chairman); IABO members of the Working Parties are: W.E. Odum, USA and G. Hempel. FRG.

The WP met in Rome, May 1972. The first report is obtainable from FAO, Department of Fisheries.

Two ACMRR/IABO Working Parties are under consideration which will be related to man-made effects, particularly pollution on marine communities and ecosystems and to the

determination of biological effects of pollution (bioassays and toxicity tests). H. Regier, Canada, was nominated as Chairman of the first Working Party.

7. REPORTS ON SYMPOSIA AND CONGRESSES 1971-1972

VII International Seaweed Symposium, Sapporo, Japan, 8-12 August 1971

The International Seaweed Symposia are held at intervals of usually three years and so far have been held at Edinburgh (1952); Trondheim, Norway (1955); Galway, Ireland (1958); Biarritz, France (1961); Halifax, Canada (1965); Santiago de Compostela, Spain (1968); and Sapporo, Japan (1971).

The main purpose of the Symposia is to provide a forum for discussions on the various aspects of basic and applied research on seaweeds, including utilization of their valuable products and assessments of the world resources of these plants.

A continuing International Advisory Committee decides in which country the next Symposium will be held; and the VII Symposium was held at Sapporo in the northern island of Hokkaido, Japan. 8-12 August 1971, under the auspices of the Science Council of Japan. The Symposium was organized by a national committee of Japanese scientists under the chairmanship of Professor Yasuhiko Tsuchiya. Altogether 363 participants (328 active, 35 accompanying) from 28 countries attended the Symposium, which was the first to be held in Asia. More than half of the scientists present were Japanese - reflecting the fact that seaweeds are much studied and utilized in Japan; they are especially prized as items of food and several of the most popular kinds, "nori" (Porphyra) and "wakame" (Undaria) are now artificially cultivated in what has become a large-scale industry. Altogether, 125 papers were read at the Symposium, four being specially invited papers and the remaining 121 contributed. The invited lectures were given by R.C. Starr (USA) "Culture collections of algae' ; A. Jensen (Norway) "The nutritive value of seaweed meal for domestic animals"; W. Yaphe & M. Duckworth (Canada) ' The relationship between structures and biological properties of agars'; R. Biebl (Austria) "Temperature resistance of marine algae".
The 121 contributed papers were grouped into four sections and presented (often concurrently) in three lecture halls - all contained in the Park Hotel, Sapporo, where most of the participants were staying - over a period of two and a half days. All of the papers were read in English and the organization of the Symposium was excellent. However, with only 15 minutes available for each paper, there simply was not enough time for discussions;
SECTION I contained 41 papers on distribution, taxonomy and morphology of marine algae, including one session on cytology and ultrastructure.
SECTION II, with 13 papers, was concerned with ecology and experimental studies and included a review of the world's seaweed resources.
SECTION III comprised 29 papers on physiology and cultivation of seaweeds, and especially interesting were the papers describing the artificial cultivation of algae in Japan and the attempts to increase the stands of Macrocystis off California.
SECTION IV included 38 papers on aspects of chemistry, biochemistry and utilization of algae. A number of the papers concentrated on polysaccharide chemistry, and some referred to the effect of algal polysaccharides in reducing radio-active strontium contamination in humans and lowering cholesterol levels in the blood of rats.

The Symposium arrangements included many occasions for informal meetings during excursions and at official receptions. Before the conference started there was a whole day field excursion to the Institute of Algological Research of Hokkaido University on the Muroran Peninsula; this gave an opportunity to see something of the rich alga flora of this coast and also

to visit the Hokkaido Fisheries experimental station at Usu where delegates saw cultivated Lam in aria being prepared for "konbu" manufacture as well as some aspects of the cultivation of the economically important crop of Porphyra ("Asakusa-nori").

The evening receptions afforded further opportunities both for meeting our Japanese hosts and for sampling the many seaweed and other seafood delicacies that are so highly regarded in Japan.

The organizers also arranged a post-Symposium Excursion, 13-16 August, for about 120 of the visitors - to see various places of Honshu, the central island of Japan. The itinerary included visits to the historical and cultural centres of Kyoto and Nara and the modern cities of Osaka and Nagoya; and in Osaka a factory processing dried Laminaria in various ways for food was visited. The party also visited the National Pearl Research Laboratory on Mikimoto Pearl Island where all aspects of the cultivation of oyster pearls was demonstrated. At a final formal dinner in Nagoya, sincere thanks were expressed to the Symposium and Excursion organizers for arranging such a highly successful and stimulating meeting.

These Seaweed Symposia are important events for both academic and applied research workers on marine algae. The Proceedings of the Seventh Symposium (edited by K. Nisizawa) were published by the University of Tokyo Press in 1972.

H.T. Powell
Dunstaffnage Marine Research Laboratory
Oban, Scotland

Symposium on Productivity of the Pacific Ocean, Canberra, Australia, 19-20 August 1971

The XIIth Pacific Science Congress of the Pacific Science Association was held at the Australia National University, Canberra, and was centered around the following four main themes:
SECTION A: Productivity and conservation in the Pacific (10 symposia)
SECTION B: Man in the Pacific (3 symposia)
SECTION C: Environmental quality and resource management: Political, legal and administrative realities (3 symposia)
SECTION D: Geological structure and mineral resources in the Pacific area (5 symposia).

About 1000 participants attended, mainly from Pacific countries.

The Symposium on Productivity of Pacific Ocean was held under the chairmanship of Dr. G. F. Humphrey on 19 and 20 August. About 50 scientists met in a small schoolroom of the Australian National University and discussed freely on the problem of productivity and fisheries in the Pacific Ocean.

Based on the contributions of this symposium the following opinions were suggested in conclusion: Primary productivity should be analysed also in connection to nutrient enrichment caused by physical processes such as upwelling; importance of micronekton should be much more emphasized in the marine food chain and the standard method for sampling should be urgently established; the knowledge of marine ecosystems should be increased synthetically not only from community structure but also from its function or process, and it should be elevated to the level of fisheries forecasting by the next Pacific Science Congress; monitoring system should be adopted for the study of marine phenomena especially in connection to marine pollution.

Speakers and lectures in this symposium were as follows:

G. F. Humphrey (Australia) Introduction

R.A. Barkley (USA) Island wakes and their effects

R. Hisard, F. Jarrige and H. Rotschi (New Caledonia) Equatorial circulation in the W. Pacific Ocean in relation to enrichment processes

R. Marumo (Japan) Ecology of pelagic blue-green algae in the Pacific Ocean

M. Blackburn (USA) Micronekton

B. Salvat (France) Quantitative balance of benthic fauna in Polynesian atolls

H.S. Kim (Korea) On the population density and biomass of Macrophthalmus japonicus de Haan (Crustacea, Brachyura) in Kyungi Bay, Korea

M. Legand, Ph. Bourret, P. Fourmanoir, R., Grandperrin, A. Gueredrat, A. Michel, P. Rancurel. R. Repelin, C. Roger - On trophic relationships at higher levels of the food chain in the tropical Pacific Ocean

K.C. Choi (Korea) Studies on the structure of a tidal flat ecosystem for increasing commercial clam yield

W. Chavin (USA) Physiological responses of fishes to the environment

0. Tabeta, H. Misu and S. Kanamura (Japan) Distribution of bottom fishes in the waters off the Pacific coast of S. America

H. Kasahara (USA) Present and potential yield of marine resources

Ryuzo Marumo
Ocean Research Institute
University of Tokyo, Japan

International Symposium on the Oceanography of the South Pacific
Victoria University of Wellington, New Zealand, 9-15 February 1972

The Symposium was organized by the New Zealand National Commission for UNESCO, with the cooperation of the Royal Society of New Zealand. It was attended by 119 participants from the following countries: Australia (18), Canada (2), Chile (1), Fiji (1), France (1), Indonesia (1). Japan (1), New Caledonia (8), New Hebrides (1), New Zealand (61), Papua and New Guinea (1), Peru (1), USSR (1), United Kingdom (1) and USA (2.0, including 2 from Hawaii). In addition there were 11 observers, representing South Pacific Commission, the Pacific Science Association, UNESCO and IOC, WMO, IAPSO, IUGS, IUBS, IUGG. FAO, and SCOR.

Some 78 papers were presented during concurrent sessions of three divisions. Physical Oceanography, Marine Biology, and Marine Geosciences.

The Symposium was particularly well organized by Mr. A.N.V. Dobbs, Chairman of the New Zealand Commission for UNESCO, and Dr. R.W. Willett, President of the Royal Society of New Zealand, through an efficient Organizing Committee. Abstracts of papers were available prior to the meeting. All papers were subject to lively discussion which was continued during morning and afternoon refreshment breaks and during formal receptions for the participants. The Symposium certainly achieved its objective of providing an opportunity for those working in the marine sciences to report on their recent and current research in the South Pacific region, that area south of the equator extending from Australia to South America, including the Coral and Tasman Seas but excluding the Antarctic.

The papers will be published by the New Zealand National Commission for UNESCO (Dept. of Education, Wellington). During the final Plenary Session a number of resolutions stressing the need for further research in specific aspects of marine science in the South Pacific were adopted and sub-mitted to UNESCO.

Resolutions, Marine Biology: It is recommended that:

1. The suggestions put forward in 1968 by Professor G.A. Knox be re-affirmed, and that it be noted that work on these is continuing on a national and institutional level (see Knox, G.A. 1970 in Scientific Exploration of the South Pacific, (ed.) Warren S. Wooster; National Academy of "Sciences Washington, D.C.).
2. The study of coral reefs and associated communities in the South Pacific be added to the list of suggested topics drawn up in 1968, in view of the growing interest of biologists especially in coral reef studies.
3. In implementation of recommendation (2)
(a) A position paper on South Pacific reef studies be drawn up for circulation to interested workers and national groups by an ad hoc committee consisting of Mr. E.W. Dawson, New Zealand Oceanographic Institute (Chairman); Professor J. E. Morton, University of Auckland; Mr. P. G. Beveridge, University of the South Pacific; Dr. D.R. Stoddart, University of Cambridge; Dr. D.M. Devaney, Bernice P. Bishop Museum; Professor F. A. Doumenge, South Pacific Commission; and Mr. J.P. Chevalier, Museum National d'Histoire Naturelle, Paris -
(b) Consideration be given to a small international meeting of South Pacific coral reef workers in
1975 at which specialists would be asked to contribute comprehensive reviews of the present state of knowledge in their fields of study, of reef communities and biogeography -
(c) Efforts be made to encourage international exchange of information on South Pacific reef studies -
(d) Consideration be given to practical problems of financing reef expeditions and of increasing the number of taxonomists working on reef biota.

Resolutions, General: It is recommended that:
1. UNESCO give consideration to the establishment of a Marine Sciences Centre for the Southwest Pacific that might act as a focus for work in a range of disciplines. It is suggested that UNESCO might convene a meeting early in 1973 to discuss the feasibility and possible functions of such a Centre.
2. UNESCO be asked to provide a framework within which future regional symposia on the oceanography of the South Pacific can be arranged at regular intervals.

Contributed Papers, Marine Biology:
N.C. Bulleid and D. J. Carpenter
D. M. Devaney
M. Fontaine. J. Deville and R. Lopez
0. Guillen
0. Guillen and R. Izaguirre de Rondan
0. Guillen, B. Rojas de Mendiola and
R. Izaguirre de Rondan
J.B. Jillett and S.F. Mitchell
J. Morton
J. Pages
C. Roger
B. Rojas de Mendiola and L.N. Ochoa
W. Stephenson
D.R. Stoddart andC.S. Gopinadha Pillai
F.J. Taylor
C.M. Vooren
J.C. Yaldwyn
Abstracts, Marine Biology:
E.W. Dawson
P. Fourmanoir and P. Rancurel
J.A. Gueredrat

M. Legand, P. Bourret and A. Michel
M. Legand and R. Grandperrin
R. J. Mclntyre
J.R. Paxton
P. Rancurel
R. Repelin
R. Repelin

A multidisciplinary programme to investigate the sources and consequences of upwelled enrichment of nutrients off the N. S.W. coast
Systematics and zoogeographic aspects of south-eastern Polynesian echinoderms
Ecology and the regulation of calcium metabolism in coral grazer parrotfish
Carbon/chlorophyll relations in Peruvian coastal waters
Distribution of chlorophyll a in the Peru Coastal Current
Primary productivity and phytoplankton in the coastal Peruvian waters
Hydrological and biological observations in Dusky Sound, Southwestern New Zealand
The eulittoral zone of tropical Pacific shores An attempt to determine the time of death of catches during long line fishing
Biological investigations of some important species of Euphausiacea (Crustacea) from the equatorial and south tropical Pacific
Observations on the food and feeding habits of Engraulis ringens Tenyus
The use of computers in classifying marine bottom communities
Coral reefs and reef corals in the Cook Islands, South Pacific
Phytoplankton and nutrients in the Hauraki Gulf approaches
The population dynamics of the New Zealand terakihi, Cheilodactylus macropteris (Bloch and Schneider), and the changes due to fishing: an exploration Decapod Crustacea from South Pacific reefs and islands
Faunal distribution and relationships in the New Zealand archibenthal zone
Sharks of New Caledonia
Influence of the equatorial divergence upon zoogeography and vertical distribution of some bathypelagic copepods in the Pacific Ocean
Micronekton in the equatorial and tropical South Pacific Ocean
Feeding habits of deep swimming tunas
The distribution of mussels in Eastern Australia and New Zealand
Bioluminescence in the Australian monocentrid fish Cleidopus gloriamaris
Coastal benthic octopods (Mollusca-Cephalopoda) of New Caledonia
On the ecology of the family Phronimidae (Crustacea - Amphipoda) in the western Pacific
Amphipods consumed by long-line pelagic fishes from the western South Pacific

Symposium on Optical Aspects of Oceanography
Copenhagen. Denmark, 19-23 June 1972

The Symposium was arranged by the Scientific Commission on Physical Oceanography of IAPSO and took place at the Institute of Physical Oceanography, University of Copenhagen. Of the altogether 18 lectures five were biological. The lectures were intended to give a general picture of the present knowledge of various aspects of optical oceanography.

Professor Per Halldal, University of Oslo, Norway, presented a review of the influence of light on photosynthesis in the various kinds of marine plants, concentrating first of all on the importance of various pigments found in these algae beside chlorophyll. At the same time he showed the influence of the spectral composition of the light found in the various depths of the neritic and oceanic regions.

Professor E. Steemann Nielsen, University of Copenhagen, presented a review concerning light and primary production in the sea. Phytoplankton was especially - but not exclusively - considered. The importance of the physiological aspects as i.a. adaptation was stressed.

Professor G. L. Clarke and Dr. G.C. Ewing, Woods Hole Oceanographic Institution, USA, presented jointly a paper: Remote spectroscopy for production studies. The research had been conducted by the two scientists on the colour of the sea, with particular reference to the use of remote spectroscopy for studies on oceanic productivity. The latter is possible because chlorophyll has a characteristic effect on the spectrum of backscattered light. Because measurements from aircraft can be made over a greater range than from ships, they make possible the procurement of synoptic surveys over extensive areas of the sea.

Dr. T.H. Waterman, Yale University. USA, talked about light and the orientation of animals. Besides giving an up to date review of all aspects of this topic he stressed the importance for the biological oceanographer to collaborate with specialists in underwater optics and pointed out that the potential strengths of a symposium like the present was its capacity of provoking some of these collaborations to take place.

Dr. P.B. Boden, Scripps Institution of Oceanography. La Jolla, USA, presented a joint paper by him and Mrs. E. M. Kampa about bioluminescence. Besides updating the literature references in the field they stressed the need for information on the spectra of luminescence of as many species or organisms of various taxonomic groups as possible. The symposium was considered very successful by all the participants.
E. Steemann Nielsen
University of Copenhagen

Symposium on the Fixation and Preservation of Marine Plankton
University of Bath, England, 13-18 July 1972
As a conclusion of its work the SCOR/UNESCO Working Group 23 arranged a symposium on the fixation and preservation of marine zooplankton. About 40 zoologists from all parts of the world attended these meetings, which offered the following lectures and demonstrations:

J. R. Beers	Methods for estimation of plankton biomass
D.J. Faber	Identification, labelling, processing and data recording methods
J. Fawell	Identification of marine zooplankton by electronic measuring devices ("Quantimet")
H.A. Fehlmann	Demonstration laboratory utensils for handling and sorting marine specimens (containers, labels, catalogues, etc.)
R.H. Harris	Deep freeze drying of marine organisms in the field and in museums
M. G. Hunt	Data processing of marine zooplankton collected by the Hardy continuous plankton recorder
M. Omori	Variation in concentrations of Hydrogen, Nitrogen and Carbon in freshly prepared and in fixed zoo-plankton
K.W. Petersen	Preservation of medusae, siphonophora, ctenophora and special techniques used for identification of preserved specimens
H. F. Steedman	Fixation and preservation in liquids, principally aldehydes
H. F. Steedman	
H.F. Steedman	
F. J. R. Taylor	
R. Turner	

Fixation and preservation in liquids - alcohols, glycols and other reagents
General physical and chemical properties of preserving reagents - osmotic properties, pH, etc.
Fixation, preservation and documentation methods in taxonomy of microplankton
Fixation, preservation and storage of marine boring mussels

Discussion after each lecture was very lively, and the accommodation on the campus of the university offered excellent opportunities for informal discussions during the evenings.

Naturally, the main interest centered on Dr. H.F. Steedman's lectures on his extensive experiments with aldehyde fixation. A summary giving full credit to Dr. Steedman's excellent presentation cannot be given here. but a complete report will appear in the UNESCO handbook which is now in preparation and a summary will be given in a shorter report to appear elsewhere.

Another subject which interested many of the delegates was the question of glassware for long-term storage. Dr. H.A. Fehlmann of the Smithsonian Sorting Center and Dr. K.W. Petersen of the Zoological Museum, Copenhagen, demonstrated the glassware and the labels in use at their respective institutions. It was agreed that an international cooperation to secure suitable, standardized glassware will be a necessity before long, and that an effort should be made to select the best types of jar on which to concentrate.

K.W. Petersen
Copenhagen

12th Meeting of the Scientific Committee on Antarctic Research (SCAR)
Canberra, Australia, August 1972

SCAR is one of the scientific committees of the International Council of Scientific Unions. The activities of SCAR, following on from the worldwide interest in the International Geographical Year led to the intergovernmental Antarctic Treaty. SCAR is the coordination body for scientific activity in the Antarctica. The committee has become the scientific advisory body to the treaty nations, and is providing the scientific basis for the immediate management of Antarctica.

The interests of SCAR at the present time include geology, geophysics, geodesy and cartography, glaciology, meteorology, upper atmosphere physics, oceanography, biology, and logistics, of
which biology is beginning to become a major concern because of the imminent exploitation of Antarctic pelagic resources.
The biology discussions at the recent meeting were centred around three main topics: scientific study, conservation, and environmental impact.
1. Scientific Studies
Krill: The Antarctic euphausiid Euphausia superba ("krill") is a key element of the Antarctic pelagic food chain, providing forage for penguins, seals, whales, and fish alike. Now that krill has begun to be exploited on a commercial scale it has become more urgent to understand its biology and assess its role in relation to the total Antarctic marine ecosystem. A study group is being set up for this purpose which will co-operate with other interested international bodies.
Bird Biology: In the past, bird-banding activities have been carried out mainly on an individual or national basis. From now on efforts will be made to establish an international basis for bird banding programmes, and to extend studies on Antarctic birds to their biology and role in the Antarctic ecosystem. At the request of the Treaty Nations, data on the catches of Antarctic birds will be collated and evaluated.

Ross Ice Shelf Project: One of the most interesting features of the Antarctic continent is the ice-covered Ross Sea shelf to the south of New Zealand. A programme is being organized to drill through the ice (300 m) traverse the seawater beneath (200 m) and drill into the sediment of the sea bottom. The main incentive is glaciological interest. However, it is also a matter of some concern to establish whether there is marine life in this strange body of water, and if so what relation it bears to the fauna around the ice edge.
Satellite Support: In such inaccessible areas as the Antarctic, observations from space take on a special value. It is anticipated that satellite monitoring may be made not only of such major features as ice cover, but also biological properties such as distribution of seal colonies and swarms of krill. In the development of such methods, SCAR will co-operate with the international agency COSPAR which will hold a symposium in May 1973 on "Application of Space Techniques to Earth Survey Problems".
Human Biology and Medicine: In September 1972 a symposium was held in Cambridge, UK, on the effects of the Antarctic environment, with particular relevance to physiology and behaviour. The symposium was organized by SCAR and co-sponsored by the International Unions of Physiological and Biological Sciences. At this symposium the future work of SCAR in this field of study was discussed.

Symposium on Adaptation in Antarctic Ecosystems: A symposium will be held on the above theme in conjunction with the next meeting of SCAR in the USA probably September 1974. One of the purposes of the theme is to foster the holistic study of the Antarctic.
2. Conservation and Management
Conservation: The interest being shown by industry in Antarctic resources such as seals, whales,
kelp, krill, Notothenid fishes and so on, and the increasing impact of Man on the Antarctic environ-
ment require that SCAR maintain a watching brief on conservation problems, and exercise an active advisory role to the Treaty Powers. In the immediate future when states have abrogated their sovereign claims to Antarctic territory, the role of SCAR in conservation management is likely to be an increasingly onerous responsibility. As a result, SCAR has reconvened its working group on conservation. Among its many tasks will be classification of Antarctic ecosystems, recommendation of areas for special protection, preparation of management plans, compilation of conservation brochures on Antarctic flora and fauna, and the coordination of biological monitoring in the area.
Seals: The stocks of seals have recovered to such an extent that commercial exploitation is imminent. To ensure that the indiscriminate slaughter of past years is not repeated. SCAR has set up machinery for monitoring seal catches and for evaluating the condition of the fishery. The Treaty Powers will be advised in advance when seal catches approach the maximal sustainable yield. It is anticipated that individual treaty powers will ensure that sealing stops at this point.
Kelp: With the increasing world demand for alginates, interest is developing in the vast subantarctic and antarctic beds of Macrocystis. The fronds of this species may be harvested continuously, like grass, without destroying the plant. The firm Alginates Pty Ltd are already engaged commercially in harvesting kelp at Kerguelen. The USA is presently studying the kelp beds on the Chilean coast. The UK (British Antarctic Survey) are initiating a study programme on kelp production.
Specially Protected Areas: As in other parts of the world, the need has arisen in the Antarctic for particular areas to be afforded special protection so that their special plant and animal communities may be conserved. This concept has now been extended to protect certain areas from indiscriminate scientific use, so that they can serve the function of "reference areas" for specialized scientific purposes.
3. Environmental Impact

SCOPE - Global Monitoring: One of the consequences of the Stockholm Conference on the Environment had been the setting up of SCOPE - Scientific Committee on Problems of the Environment. Part of their strategy calls for Antarctic monitoring stations which it is hoped will provide an unpolluted baseline for global monitoring.
Wastes: Although the Antarctic area is vast, the number of bases is increasing, and these areas are becoming increasingly fouled by human occupation. Because Antarctica as a whole has an important role in the understanding of pollution on a global scale, every effort is being made to handle wastes in the Antarctic in a responsible manner. This meeting of SCAR addressed itself to the practical detail of whether wastes should be disposed of in the Antarctic or returned to the countries of their origin; whether wastes should be disposed of at sea or on land; and whether wastes should be burnt or buried in crevasses.
Radio-isotopes: The general concern for the Antarctic environment as an unpolluted baseline for the world at large extends to the use of radio-isotopes in the area. This SCAR meeting distinguished between closed system experiments in which little radioactivity was released into the environment and open experiments e.g. in Antarctic lakes. Guidelines were laid down for the latter, and research workers were encouraged to report instances of accidental discharge.
Introduction of Foreign Species: Continuing care is being taken to control the introduction of foreign species of animals, plants and microbes. The latest precaution concerns the possible introduction of "Newcastle Disease", a disease of birds carried by contaminated poultry, even in the frozen state.
Dogs: Microbiological evidence shows that dogs are introducing canine micro-flora into the Antarctic, generating some confusion in studies of soil microbiology. For this reason and because dogs share common vectors with man, records will be kept of dogs brougt on to the Antarctic continent and the routes which they have taken in expedition work.
Impact Statements: Although it is the habit of Antarctic bases to disturb their immediate environment as little as possible, this is usually done on an ad-hoc basis rather than as an overall strategy. With the threat of commercial development in the area, it has become necessary for science and technology to establish by example and by precedent the way that Man can live in harmony with the Antarctic environment. Consequently, Treaty Powers will be encouraged to assess in advance the impact that new bases and enterprises will have on their immediate environment, and to circulate these "impact statements" to other Treaty Powers.
David J. Tranter
CSIRO, Division of Fisheries and Oceanography
Cronulla, Australia

The Centenary of the Challenger Expedition
Edinburgh, Scotland, 12-20 September 1972

The second International Congress on the History of Oceanography was held in Edinburgh in September 1972 to celebrate the centenary of the famous Challenger Expedition. The little wooden corvette HMS Challenger set sail on December 21st 1872 to explore the oceans of the world. Under the direction of Professor Wyville Thomson of Edinburgh the four scientists aided by an artist and a boy to skin birds were charged to record the physical and chemical conditions at all depths in the sea, to chart the ocean bed and the nature of its sediments and to determine the nature of marine life everywhere'. No mean task with the primitive gear available at that period. None the less after a circum-navigation of the world lasting three and a half years, HMS Challenger returned laden with many volumes of records and thousands of jars of sediments and pickled specimens. These were examined by leading scientists of many countries and their findings were eventually published in the 50-volume Challenger Reports. It is on this foundation that modern oceanography has been built.

The Centenary of the Challenger was organized by the Royal Societies of London and Edinburgh and was attended by more than 350 scholars and scientists of 32 nations. The

programmes catered for the diverse interests of historians, oceanographers and mariners. Apart from the lectures which dealt very largely with^the development of marine science and the history of navigation, there were visits to research vessels and excursions to four marine laboratories. The Royal Scottish Museum mounted an excellent exhibition of the equipment of the Challenger and the specimens she collected. Last but not least there were five well attended receptions at which the national beverage of Scotland flowed freely and scientists were stimulated to discuss problems of mutual interest around the world.

It was impossible to cover the whole programme and I shall concentrate on aspects of interest to a marine biologist. Full details of the 100 lectures will be found in the two large volumes of preprints available from the Royal Society of Edinburgh for -L6 each (Proc. R. Soc. Edinb.. volumes
72B and 73B).

The lecture programme was divided into many sections but the papers dealt with three periods: ocean science and navigation before the Challenger Expedition, the Challenger Expedition itself
and reviews of progress over the last hundred years. Speakers dealing with the first period dealt with such diverse topics as the fishing methods of the early Egyptians, theories regarding the action of the rudder, the history of charting and early tidal predictions. Biologists dealt with the developments which led up to the Challenger Expedition. From the days of Linnaeus, the nature of marine life in coastal waters was fairly well known, but early dredging by Edward Forbes suggested there was no life below 300 fathoms. Then the discovery of a primitive crinoid by Michael Sars in the deep Norwegian Sea and dredging by Wyville Thomson revealed a rich fauna down to 2435 fathoms. This led to speculations that the depths of the oceans harboured many strange and primitive animals, possibly even "Urschleim" and the origin of life. It was argued that as Brittania ruled the waves Britain must be the leader in ocean science. In addition to these theoretical and emotional arguments there was the very practical need to decide routes for transoceanic cables. Dr. Carpenter and Professor Wyville Thomson put these arguments very cogently before the Royal Society and the Royal Navy. In this way the Challenger Expedition was approved.

The lectures on the expedition itself, the personalities involved and the difficulties they had with equipment, sickness and desertion allow one to judge more accurately the value of the Challenger Reports. There are inaccurate soundings, incorrect temperature records, wrong identifications and many other faults but no other expedition has obtained so much new knowledge with such poor equipment.

In reviewing progress over the last century many speakers paid tribute to the studies of the Challenger Expedition. Marine chemistry developed rapidly once the constancy of the major ions had been established and several papers dealt with recent theories regarding the carbon dioxide system, the concentration of radio nucleides and other minor constituents. The few lectures on physical oceanography dealt mainly with the branching of the Gulf Stream. There seemed to be no central theme among the biological papers although there were interesting accounts of the vertical and latitudinal distribution of deep sea shrimps, laminar flow over the surface of swimming cetaceans which explains Gray's paradox and the development of international organisations to control fisheries. Possibly the best connected series of lectures was that which dealt with the sea floor and the development of marine geology. The work of Sir John Murray on sediment samples collected by the Challenger provided a firm foundation; more recently precision echo sounders, seismic refraction techniques and magnetometers led to modern theories of plate tectonics and deep sea drilling by the Glomar Challenger. One of the most thought-provoking papers dealt with the numbers of publications in marine geology. It would seem that the rate of publication in this field is constantly accelerating so that most of all

papers ever published appeared within the last ten years. In spite of this. 50% of papers cited were written by 2% of the total list of authors.

During the congress visits were arranged onboard research ships in the port of Leith, Edinburgh. Unfortunately none of the vessels carried biological equipment. The largest vessel was the 7000 ton Akademik Kurchatov, bristling with radar antennae and sonar equipment. She had just returned from a multi ship investigation of air-sea interactions in the mid Atlantic. It was interesting to learn that she is one of seven large research vessels built in East Germany as part of the war reparations. HMS Hecate was beautifully fitted out for hydrographic surveys but like the new South African hydrographic vessel Protea she is not equipped for biological work. Even the Scottish fishery research vessel had been stripped of biological gear to prepare her for the role of a hospital ship in the UK-Iceland fishing "war".

The excursions to the two fisheries laboratories at Aberdeen and the Scottish Marine Research Laboratory at Dunstaffnage near Oban were all too short. There was hardly time to do more than admire the excellent equipment and appreciate the scope of the investigations. I was particularly
impressed by the use of TV to determine the sustainable rate of swimming in fishes, the finding that fatigue after accelerated swimming persists for more than a day, and the measurement of the sensitivity of cod to trawler noise by means of conditioned reflexes.

John H. Day
University of Cape Town
South Africa

International Symposium on Cnidaria
Japan, 16-19 October 1972

A symposium subtitled "Recent trends in research in coelenterate biology" was held at Shirahama and Kushimoto, Japan, under the presidency of Dr. Tohru Uchida who gave the opening address.

Some forty contributed papers were read covering a variety of topics, including evolutionary, systematic and life-history accounts of hydroids and scyphozoans, ecological and distributional work, developmental, reproductive and cellular studies, symbiotic algae and other symbiotic associations, anthozoan toxins, physiological, behavioural and structural studies on a variety of species, and nematocyst discharge and control. Films on hydromedusan and anthozoan behaviour and on a nematocyst discharge were exhibited.'

In addition to a considerable number of Japanese biologists (reflecting long-standing and widespread interest in cnidarians in Japan) others attending the meeting came from Canada, the United States, Germany, France, the United Kingdom and South Africa. The success of the meeting owed very much to the efficient and cordial arrangements for the sessional meetings and for the accommodation of those attending, made by Dr. Takasi Tokioka of the Seto Marine Biological Laboratory of Kyoto University and assistants.

During the symposium opportunities were provided for inspecting the Seto Laboratory and its fine aquarium, and for visiting the nearby Fisheries Laboratory of Kinki University, with its ponds and floating net cages for cultivation of fish. One day was enjoyably spent, by invitation of the director Dr. Tamura, at the Kushimoto Marine Park Center, where sessions of papers were held in the laboratory and where the fine marine aquaria and underwater observatory were viewed, the rich and colourful marine fauna of Japanese seas being much admired. On the

lighter side, participants at the symposium were entertained at evening receptions given at Kushimoto by Dr. Tamura and at Shirahama by the Mayor of the town.

The Proceedings of the Symposium will appear in the Publications of the Seto Marine Biological Laboratory.

C. Edwards
Dunstaffnage Marine Research Laboratory
Oban, Scotland

8. FORTHCOMING SYMPOSIA AND MEETINGS

Second International Meiofauna Conference
University of York, England, 7-14 June 1973

Dedicated to Professor Adolf Remane, on his 75th birthday, and in tribute to his founding of the now world-wide interest in meiofaunal research. Open to all interested persons. 2 main topics:

(1) community studies
(2) single taxon studies

Local organiser: Dr. J.S. Gray. Wellcome Marine Laboratory, Robin Hood's Bay, Y022 4SL, England.

Third Baltic Symposium on Marine Biology
Helsinki, Finland, 11-17 June 1973

The topics will be:
(1) Production, food webs and ecological models of the Baltic
(2) Indicator organisms / communities of different environments in the Baltic

The Symposium will embrace workshops on standardisation and intercalibration of methods used routinely by Baltic laboratories. About 170 participants are listed.
Symposium Office: Department of Botany, University of Helsinki, Unioninkatu 44, SF-00170. Helsinki
17. Finland.

Second International Symposium on Coral Reefs
Great Barrier Reef, Heron Island, Australia, 22 June - 2 July 1973
Sponsors: Committee for International Symposia on Coral and Coral Reefs and the Great Barrier Reef Committee. The organizers report that the response to the first circular has been over-whelming and it is likely that members, drawn from all branches of marine science, will represent 35 countries. Convener is Dr. G. R. Orme, c/o Department of Geology and Mineralogy, University of Queensland, St. Lucia, Queensland 4067. Australia. In conjunction with the Symposium , the SCOR Working Group on quantitative methods in reefs ecology will meet and carry out certain comparative field tests.

Symposium on the Eastern Mediterranean Sea
Malta. 11-15 September 1973

The Symposium is arranged by the Marine Section of the International Biological Program and will be held at the International Ocean Institute of the Royal University of Malta. The Symposium will be divided into five sections which include:
(1) Biological Effects of Migrations through the Suez Canal

(2) Effects of Damming the Nile River
(3) Exchange between the Mediterranean and Black Seas
(4) Pollution in the Eastern Mediterranean
(5) General Biology, Physics, Chemistry and Geology of the Eastern Mediterranean

Though priority will be given to communications dealing with the Eastern Mediterranean (east of 22° E.) as defined, other communications related to the Eastern Mediterranean will be considered for presentation.

Papers will be published in the Proceedings of the Symposium. Completed manuscripts must be submitted before the end of the Symposium.

A limited number of travel grants may be available for scientists from developing countries.
Local organizer: Dr. Neil C. Hulings, Department of Biology, American University of Beirut, Beirut,
Lebanon.

Second International Estuarine Research Conference
Ocean Forest Hotel, Myrtle Beach. South Carolina, USA. 15-18 October "973
The Conference is arranged by the Estuarine Research Federation and co-sponsored by the American Society of Limnology and Oceanography. The theme is "Recent Advances in Estuarine Research" and areas of review are chemistry, biology (convenor: John D. Costlow. Duke University), geology, the estuarine system and engineering. The Convenors will invite participation on selected topics in each of these areas to pro vide review and develop perspectives. On each selected topic a series of invited papers will be presented with generous time for discussion. These papers will be published as the Conference Proceedings and as the first of a biennial review series. "Recent Advances in Estuarine Research".

The Conference program will include addresses by several distinguished guest speakers on pertinent aspects of estuarine research. Exhibits of new techniques, gear. instrumentation, and other improvements will be displayed.
General information: Austin B. Williams, Systematics Lab.. National Marine Fisheries Service, U.S. National Museum, 10th & Constitution Avenue, N.W., Washington, D.C. 20560. USA.

Symposium on the Phylogeny and Systematic Position of the Pogonophora
Zoological Central Institute, University of Copenhagen. Denmark, 1-3 November 1973
Sponsor: The Danish Research Council

Participants are invited to present relevant, new papers, provided that these have not and will not be published elsewhere. These papers will be published in a separate issue of the "Zeitschrift fur zoologische Systematik und Evolutionsforschung".

The program will include a workshop session (with presentation of films, photographs, diagrams, specimens, microscopical preparations, etc., and with informal discussions), presentation of papers, summaries and discussion by an invited panel.
Organizing Committee: Dr. Arne N0rrevang, Institute of Comparative Anatomy, Universitetsparken

15, DK-2100 Copenhagen, Denmark.

Hong Kong Special Symposium on Marine Sciences
Hong Kong, 7-16 December 1973

The Symposium will be held under the auspices of the Pacific Science Association, sponsored by the Hong Kong Committee for Scientific Co-ordination with the co-operation of the two universities in Hong Kong. In the marine field themes are:

(1) Marine Ecology
(2) Fisheries and Mariculture
(3) Oceanography
(4) Pollution
(5) Fouling

Symposium Secretariat: Royal Observatory, Nathan Road, Kowloon, Hong Kong.

Polar Oceanography Conference
Montreal, Canada, 6-11 May 1974

Theme of the Conference: The relation between special physical conditions both past and
present in the Polar Oceans and their consequences for life in the sea.
The four main headings of the program are:
(1) Polar water masses: formation and distribution; bottom water; ocean fronts; convective processes.
(2) Ice: biota; hydrodynamic and biological effects.
(3) Productivity, poles and tropics; water column stability; production cycles, ecosystem diversity; seasonality; fisheries.
(4) Climatic change: Cenozoic history; events in the past 200 years; relation between the two polar regions; past changes in productivity.

The Conference is arranged by SCOR/SCAR. All speakers and formal discussants have been invited. It is estimated that the attendance will not exceed 150.
Convener: Professor M. J. Dunbar, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada.

International Symposium on the Grey Mullet
Haifa, Israel, 2-8 June 1974

The Symposium is organised by the International Biological Programme, Marine Productivity Section, as a summary Symposium on the achievements of the international effort on Grey Mullet cultivation studies.

The Symposium is co-sponsored by FAO, UNESCO and IABO, as well as by the Israel National Council for Research and Development and by the Israel Academy for Sciences and Humanities.
The Symposium will be divided into seven main subjects of discussion:
(1) Taxonomy of Mugilidae and identification of young stages
(2) Biology and ecology of the Grey Mullets (adaptation, development, growth, food, etc.)
(3) Physiology of reproduction of the Grey Mullet
(4) Diseases and parasites
(5) Artificial reproduction and stages of development until post-larval stages
(6) Methods of artificial breeding and fish-pond techniques
(7) Position of Mugilidae in aquaculture

Thus, the first four subjects deal with the fish in its natural environment, the last three subjects deal with the Mugilidae as an object of cultivation.
Local Organizer: Dr. O.H. Oren, Israel Oceanographic and Limnological Research Ltd.. 120 Haatzmauth Road, P.O. Box 1793, Haifa. Israel.

VIIIth International Seaweed Symposium
University College of North Wales, Bangor, UK. 17-24 August 1974

A national Organizing Committee is already arranging a programme which, following well established traditions, will be open to all those who are interested in the various aspects of seaweeds, ranging from the purely scientific to industrial utilization.

A post-symposium excursion will be arranged for 24-28 August in the Isle of Man, centred at the Marine Biological Laboratory (University of Liverpool), Port Erin. It will be organized in two
parallel sections, one for divers and one for shore collectors, each including seminars on field techniques.
Symposium Secretariat: VIII International Seaweed Symposium, c/o Marine Science Laboratories,
Menai Bridge, Anglesey, UK.

International Symposium on Evolution of Post-Paleozoic Ostracods
Hamburg. FRG, 19-22 August 1974 (proposed dates)

Organized by the International Committee of Recent Ostracoda under the sponsorship of the International Paleontological Association (IPA). The Symposium theme is Evolution of Post-Paleozoic Ostracoda. Taxonomic or other non-phylogenetic contributions will be presented on display tables in connection with the Symposium, but will not be included in the discussion sessions or published in the Symposium volume.

Pre- and post-symposium field trips are planned to the North Sea and the Baltic (recent sampling) and to the Harz Mountains (Tertiary or Mesozoic).
Symposium Secretary: Prof. Dr. G. Hartmann, Zoologisches Institut und Zoologisches Museum, D2 Hamburg 13, Papendamm 3, Germany FRG.

First International Congress of Ecology - Structure, Function and Management of Ecosystems
The Hague, Netherlands, 8-14 September 1974

The Mqrning_Sessions_ (Plenary) will include the following themes:
(1) Flow of energy and matter between trophic levels.
(2) Comparative productivity in ecosystems.
(3) Diversity, stability and maturity in natural ecosystems.
(4) Diversity, stability and maturity in systems influenced by human activities.
(5) Strategies for management of natural and man made ecosystems.

Final Session: Significance of ecological principles for society.
The Afternoon Symposia (concurrent) will include:
A. Reports on research work related to the theme of the morning plenary.
B. A special series of IBP intersectional (biome) synthesis symposia:
(1) Freshwater, brackish and marine ecosystems - the similarities and differences at all trophic levels.
Convener; K. Mann.
(2) Global geography of biological productivity.
Convener: L.E. Rodin (requested).
(3) The evolution of ecosystems and its contribution to biogeography and evolutionary theory.
Conveners: H. Mooney and M. Dunbar.
(4) Stable and unstable ecosystems with man as an integral component in different climatic zones.

Conveners: M. Evenari and Th. Monod.
(5) Prediction of ecosystem response to human intervention.
Convener: D. Goodall.
C. One or more special symposia, as follows:
(1) Critical evaluation of systems analysis and modelling in ecosystems research and management.
(2) Data collecting and processing for predictive purposes.
(3) Methods of experimentation with ecosystems a) in the laboratory b) in the field.
(4) Ecological interpretation of remote sensing data.
(5) Parasitic life cycles as a part of ecosystems.
(6) Population ecology: the Lotka/Volterra concept today (competition and co-existence).
(7) Ecology of aquatic systems as a reflection of their drainage basins.
(8) Ecological consequences of deforestation (related to theme 4).
(9) Symposium of the International Organization on Biological Control: the importance of naturally occurring biological control in natural ecosystems (as related to theme 4).
D. Business and organizational meetings.
Secretary: Dr. G.P. Hekstra, Biologische Raad, Kloveniersburgwal 29, Amsterdam.

Symposium on Marine Plankton and Sediments
Kiel University. FRG, 9-13 September 1974

The Symposium has been planned by SCOR Working Group 37; the provisional program is as follows:

(1) Meetings of consultant groups
Six different planktonic organism groups are proposed: Planktonic Foraminifera, Pteropods. Radiolarians, Diatoms + Silicoflagellates, Dinoflagellates and Coccoliths.
(2) Invited lectures
(a) Biogeography (2)
(b) Microfossils in Deep-Sea Sediments (4)
(c) Biogeography and Evolution of Plankton in Cenozoic and Mesozoic Deep-Sea Sediments
(d) New results from Plankton Groups (3)
(e) General Methods (4)
(3) Shorter Contributions
This section will be open for non-invited speakers. Parallel sessions will be necessary.

It is expected that the Symposium will provide a major opportunity to synthesize results of the Deep Sea Drilling Project and very significant micropaleontological work on ocean sediments undertaken since 1967.
Convener: Prof. Dr. E. Seibold, Geologisches Institut, Universitat Kiel, Olshausenstrasse 40/60, 23
Kiel, Germany FRG.

13th Pacific Science Congress Symposium on Aquatic Resources and their Management
University of British Columbia, Vancouver, Canada, 18-30 August 1975

The theme embraces natural and man-induced changes in the aquatic resources of the Pacific Ocean area.
A. Plenary Lecture
The development of public policy for the rational use, distribution and consumption of aquatic resources including the inter-relationships of coastline use, environmental protection, multi-use problems and recreational development.
B. Symposia

(1) Energy Transformation - Productivity of the Aquatic Environment.
Productivity of various animal groups such as zooplankton and fish, as well as community analyses (benthos, neuston, etc.); work on productivity modelling will be included.
(2) A Comparison of Fishery Research and Management Structure and Strategy of the Pacific Rim Nations. An overview of effectiveness of various approaches including country or regional reviews.
(3) The State of Commercial Aquaculture. Research and application on all aspects of freshwater, brackish and marine aquatic husbandry.
(4) Aquatic Pollution in the Pacific.
A discussion of pollutants ranging from those that are clearly toxic to those that simply induce a change in water character.
(5) Distribution of Biota in Relation to Oceanic Circulation.
Designed to bring together physicists, chemists and biologists interested in the fundamental and applied aspects of oceanic, inshore and estuarine circulation phenomena.
(6) Education and Information Science in Aquatic Field.
Schools and training centers, data banks and statistical papers.
(7) Perspectives on the Pacific Aquatic Sciences, an Assessment of Lacunae in Fundamental and Applied Studies. Reviews of a wide variety of aquatic subjects (systematics, physiology, biogeography. geochemistry, oceanography, limnology, etc.).

C. Contributed Papers
These will relate to the symposia themes and provide for the presentation of detailed and technical information.
Secretary-General: Prof. W. S. Hoar, University of British Columbia, Vancouver 8, Canada.

Second Joint Oceanographic Assembly
Edinburgh, Scotland, 13-24 September 1976

A Steering Committee for JOA 1976 has been established, with representatives of SCOR,
IAPSO, IABO, CMG, ACMRR, ACOMR, ECOR and the Royal Society of London. Professor W. S. Wooster, Past President of SCOR, is chairing the Committee.

In 1970 the first Joint Oceanographic Assembly was held in Tokyo as a successor of the previous International Oceanographic Congresses. The meeting in 1976 will be organized along the
same general lines, concentrating on the inter-disciplinary aspects of oceanography.

Sessions will occupy eight days and consist of general symposia, special symposia, meetings on contributed papers and meetings of organizations. General Symposia will deal with topical events in modern oceanography and will include three speakers per half-day. Special Symposia will focus on inter-disciplinary problems and usually include six speakers per half-day; two such symposia will be scheduled concurrently. In the case of contributed papers, as many as three sessions will be scheduled at the same time. In these sessions the contributed papers will not be read by their authors but will be reviewed in groups by selected rapporteurs.

9. ICSU STATEMENT REGARDING CONDITIONS FOR THE EFFECTIVE CONDUCT OF OCEANIC RESEARCH

Natural phenomena seldom correspond in location with national boundaries, and their understanding often requires them to be studied wherever they extend or move. This is particularly true in the oceans where ease of access and flexibility of movement are essential for the effective conduct of oceanic research. Yet, because of the distribution of resources and

of man's activities and their effects on the environment, much of this research must take place in the waters and on the sea-bed within a few hundred kilometers off the coast.

It is for this reason that in 1954 the Bureau of the International Council of Scientific Unions (ICSU) asked UNESCO to convey to the United Nations Organization its belief that fundamental marine research carried out with the intent of open publication is in the interest of the whole of mankind.
In 1958, following the Convention on the Continental Shelf, the General Assembly of ICSU requested its National Members to assist in ensuring that permission to conduct investigations of the bottom and the subsoil of the continental shelf be granted to any bona fide scientific research vessel.

Scientific research leads to improved understanding of oceanic features, processes and populations and is, therefore, important for all mankind as a basis for the rational use of the oceans, their resources and for protection of the marine environment. Any regulations or restrictions, on the conduct of open research in the areas beyond the limits of territorial waters, would inhibit the advancement of scientific understanding, and would be detrimental to the future welfare of people of all countries.

ICSU believing that it is in the common interest of all nations to participate and cooperate in ocean research, and to facilitate it to the fullest extent possible, adopted at its 14 General Assembly in Helsinki in September 1972 the following resolution:

"Recalling the position on fundamental research taken by the ICSU Bureau in 1954, and the resolution by the 8 General Assembly in 1958, on research on the continental shelf,

Noting that the scientists of all countries should be able to conduct open research in the ocean, on the understanding that in so doing they accept an obligation to the adjacent coastal States to ensure that these States shall be able to participate in the research and share fully in its benefits,

Recognizing that for many countries this will require that greater attention be paid and necessary assistance be provided to strengthen their capability to participate in the research and to utilize the results,

Recognizing further that there must be an improvement in the exchange and dissemination of scientific information and in the other means whereby scientific results are made available,

Recommends that in all cases, oceanic research should be conducted so as not to harm the environment or to interfere unjustifiably with other marine activities,

Urges that every Nation concerned with developing the law of the sea give special consideration to the need for facilitating the conduct of open research in the ocean - research which is intended for everyone's benefit and is characterized by full and timely availability of research plans and results, and requests its National Members to bring this important matter to the attention of their governments.

10. REPORTS BY NATIONAL CORRESPONDENTS

During the meeting of members of the Executive Committee in Edinburgh it was agreed that although we did not anticipate detailed reports by the National Correspondents on activities in their home countries (corresponding to those given in vol. 1 of the Proceedings) some National

Correspondents might wish to bring to the attention of colleagues abroad new developments in their home country since they prepared their report for the Proceedings, vol. 1.

A few National Correspondents have prepared such reports which are given below. In the next volume of the IABO Proceedings we intend to publish reports from all National Correspondents.

ARGENTINA

Several new developments in marine biology have taken place in Argentina since my last report (October 1970). The following is, however, the most important.

A new oceanographic ship is being built in an Argentine dockyard. This ship will have the following dimensions: Length - 76 m; breadth - 13 m; depth -6.4 m. She will have 10 laboratories and accommodation for 23 scientists. This vessel will start her cruises in 1975.

E. Boltovskoy

INDIA

Biological Oceanography work is mainly carried out in the National Institute of Oceanography, Goa, in the Central Marine Fisheries Research Institute, Cochin, and the Marine Biology/Biology/Oceanography Departments in the Kerala, Cochin, Annamalai, Madras, Madurai, Bombay, Andhra and Karnatak Universities. Some of the Fishery Departments in the Maritime States also conduct studies related to Marine Biology and Fisheries. The Indo-Norwegian Foundation, UNDP Project on Pelagic Fisheries and the Offshore Fisheries Units carry out resources and exploratory surveys with special reference to pelagic and benthic fisheries. The Marine Organisms Scheme of the Forest Research Institute carries out studies on the fouling and boring organisms in the major harbours and coastal regions.

The main problems that are being investigated in the above institutes are - primary production in the estuaries and coastal waters, microbiological studies in the estuaries, beaches and mangroves, marine parasitology, phytoplankton culture, studies on marine algae, benthos and animal communities in the estuarine and inshore waters, foraminiferans in the plankton and in the estuarine and inshore sediments, ecology and food chain of beaches, intertidal and interstitial fauna, culture of plankton organisms, studies on fish eggs and larvae, molluscs and molluscan fisheries, biology and fishery of prawns and other crustaceans, studies on sardines and mackerel, fishery and biology of elasmobranchs, bombay duck, tuna, catfish, perches and other important fisheries, evaluation of demersal fishery resources, experiments on pearl culture, investigations on the mud banks of the Kerala coast and their influence on fishery, pollution in the estuaries and inshore waters. Most of the research activities are in the estuaries and inshore waters, rarely extending up to the limit of the continental shelf.

The Cochin, Annamalai and Andhra Universities have full-fledged Marine Biological Laboratories and besides carrying out Biological Oceanography research programmes, conduct two-year Master of Science courses. Students are also admitted in the above universities as well as in Kerala, Karnatak and Bombay Universities for carrying out research programmes leading to doctorate degree.

At present one 72 ft. research vessel "Varuna" owned by the Indo-Norwegian Project and small vessels - R.V. "Nauplius", R.V. "Neendakara", R.V. "Tarini", possessed by the National Institute of Oceanography and R.V. "Sagitta" of the Cochin University are available for research studies. A large and full-fledged research vessel of 170 ft. length "Rastrelliger" will be

received by the UNDP Project shortly and another larger research vessel of 220 ft. is being equipped for National Institute of Oceanography.

Results of the investigations in Biological Oceanography are published in foreign as well as Indian journals. The main Indian journals that publish papers in marine sciences are: Proc. Nat. Inst. Sc. , New Delhi; Journ. Mar. Biol. Assocn. India, Cochin; Proc. Ind. Ac ad. Sc.. Bangalore; Bull. Dept. Mar. Biol. & Oceanogr. (Bull. Dept. Mar. Sc.), Cochin; Indian Journ. Mar. Sc., New Delhi; Proc. Zool. Soc. India, Calcutta; Rec. Ind. Mus., Calcutta; Ind. Journ. Fish., Cochin; Journ. Bombay Nat. Hist. Soc., Bombay; Fish. Tech., Cochin.

During 1965 to 1972 a series of Symposia related to Biological Oceanography were conducted by different organizations and the papers read in the Symposia were published as separate volumes. Symposium on Indian Ocean, 1967, New Delhi, organized by the National Institute of Oceanography; Symposium on Crustacea, 1965, Cochin; Symposium on Mollusca, 1968, Cochin; Symposium on Corals and Coral Reefs, 1968, Mandapam; Symposium on Living Resources, Cochin, 1968; and Symposium on Indian Ocean and adjacent seas. Cochin, 1970, organized by the Marine Biological Association of India. The first and second Symposia on Estuarine Biology were organized at Madras in 1969 and Porto Novo in 1972 by the University Grants Commission. The Symposium on intertidal Ecology, Waltair, 1970, and Symposium on Algae, Madras, 1970, were organized by the University Grants Commission.

C.V. Kurian

SOUTH AFRICA

Since more than one hundred papers have been published within the last two years only the main lines of research are discussed. At present about fifty marine biologists are employed in the Division of Sea Fisheries, the Universities of Cape Twon, Port Elizabeth and Rhodes, at the Oceanographic Institute in Durban, the National Institute of Water Research, the museums at Cape Town and Port Elizabeth and the Cape Department of Nature Conservation. The South African National Committee for Oceanographic Research (SANCOR) has drawn up a national programme for the period 1971-75 and finances approved projects not covered by the Division of Sea Fisheries. Other institutions finance the remaining projects.

The Division of Sea Fisheries employs about 20 scientists and is currently focussing its effort on the decline of the S.W.African pelagic fisheries due to overfishing possibly aggravated by poor year classes. It is interesting to note that as pilchard catches have declined the anchovy catches have increased and mesopelagic fishes such as Maurolicus have moved into shelf waters. Demersal fisheries have also declined (particularly hake) and an international committee has been set up to prevent overfishing in the S.E.Atlantic. The catches of rock lobster (Jasus lalandii) have also been poor and more research on recruitment, growth rate and migrations is in progress.

The Department of Zoology at the University of Cape Town, together with the CSIR Oceanographic Research Unit. includes twelve marine biologists. The main research projects include investigations of the distribution of benthic invertebrates and the associated fish fauna along transects below the Benguela and Agulhas currents. These projects have necessitated further taxonomic studies of the South African Amphipoda, Cumacea and Opisthobranch Mollusca and a study of invertebrate larvae and the factors which favour metamorphosis and settling. Work has commenced on the biomass of different components of the rocky shore fauna and the difference in biomass across the continental shelf.

The South African Museum employs four marine biologists. They have recently completed a study of the intertidal fauna of S.W.Africa and taxonomic studies of S. African Hydrozoa, Decapod Crustacea, Cephalopods (Sepiidae) and skates (Rajidae). A study of mesopelagic fishes has commenced.

The J.L.B. Smith Institute of Ichthyology has two biologists who have recently completed a review of the family Apogonidae.

Many workers in other organizations are engaged in various aspects of estuarine ecology. The Port Elizabeth Museum is studying the estuarine plankton and the breeding of penaeid prawns. Dr. B. Hill and his assistant at Rhodes University have completed a biological study of the mud prawn Upogebia and are now working on the swimming crab Scylla serrata. The Cape Department of Nature Conservation has two biologists studying the ecology of the Heuninges estuary and the biology of the estuarine fish Lithognathus lithognathus. The National Institute of Water Research has a group of three biologists at Durban working on the disposal of effluents and the effect of pollutants from aluminium works into Richards Bay estuary. Finally the Oceanographic Research Institute at Durban has a group of three biologists working on the biology of estuarine fishes and the culture of penaeid prawns. In addition to this they have recently published reports on the rock lobster Palinurus homarus and Panulirus gilchristi.

John H. Day

11. NOTES

NORDMAR is a Newsletter, written in English and published by the Nordic Council for Marine Biology. The first issue (February 1973) contains articles on NCMB and a new marine laboratory at the Limfjord. Denmark, as well as a list of Danish and Norwegian marine biologists and the animal groups and/or general problems on which they work. A similar list of Finnish and Swedish marine biologists will be published in the next issue of NORDMAR.

Within reasonable limits copies will be sent free of charge to anyone with an interest in Nordic marine biology. The Editor is Dr. A.M. Christensen, Marine Biological Laboratory, Strandpromenaden, DK-3000 Helsingør, Denmark.

ABBREVIATIONS

ACMRR	Advisory Committee on Marine Resources Research (of FAO)
ACOMR	Advisory Committee on Oceanic Meteorological Research (of WMO)
CICAR	Cooperative Investigation of the Caribbean and Adjacent Regions
CIM	Cooperative Investigation of the Mediterranean
CINECA	Cooperative Investigation of the Northern Part of the Eastern Central Atlantic
CMG	Commission on Marine Geology (of IUGS)
COSPAR	Committee on Space Research (of ICSU)
CSK	Cooperative Study of the Kuroshio and Adjacent Regions (of IOC)
ECOR	Engineering Committee on Oceanic Resources
GELTSPAP	Group of Experts on Long Term Scientific Policy and Planning
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GIPME	Global Investigation of Pollution in the Marine Environment
IABO	International Association for Biological Oceanography (of IUBS)
IAMAP	International Association of Meteorology and Atmospheric Physics (of-IUGG)
IAPSO	International Association for the Physical Sciences of the Ocean (of IUGG)
IASH	International Association of Scientific Hydrology (of IUGG)

IBP/PM	International Biological Programme / Productivity Marine
ICES	International Council for the Exploration of the Sea
ICGSO	International Coordination Group for the Southern Ocean (of IOC)
ICNAF	International Commission for the Northwestern Atlantic Fisheries
ICSU	International Council of Scientific Unions
IGOSS	Integrated Global Ocean Station System (of IOC)
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data Exchange (Working Group of IOC)
IUBS	International Union of Biological Sciences (of ICSU)
IUCN	International Union for the Conservation of Nature and Natural Resources
IUGG	International Union of Geodesy and Geophysics (of ICSU)
IUGS	International Union of Geological Sciences (of ICSU)
LEPOR	Long-Term and Expanded Program of Oceanic Research
NAMDI	National Marine Data Inventory
NODC	National Oceanographic Data Center (USA)
NORPAX	North Pacific Experiment
ROSCOP	Report of Observations or Samples Collected by Oceanographic Progr;ii'-s
SCAR	Scientific Committee on Antarctic Research (of ICSU)
SCIBP	Special Committee for International Biological Programme (of IC'.Sl
SCOPE	Scientific Committee on Problems of the Environment (of IC'SI. •
SCOR	Scientific Committee on Oceanic Research (of ICSU)
SOSC	Smithsonian Oceanographic Sorting Center (USA)
WDC-A	World Data Center A - Oceanography