IABO
Proceedings
Vol. 3, 1976

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
DIVISION OF ENVIRONMENTAL BIOLOGY

INTERNATIONAL ASSOCIATION FOR BIOLOGICAL OCEANOGRAPHY

IABO is an association under the Division of Environmental Biology of the International Union of Biological Sciences (IUBS). It is affiliated to the Scientific Committee on Oceanic Research (SCOR).

THE EXECUTIVE COMMITTEE

President:	Professor, Dr. Gotthilf Hempel Institut für Meereskunde an der Universität Kiel 23 KIEL Düsternbrooker Weg 20 Germany (F.R.G.)
Secretary:	Dr. Torben Wolff Zoological Museum Universitetsparken 15 DK-2100 COPENHAGEN 0 Denmark
Past President and Treasurer:	Mr. Ronald I. Currie Scottish Marine Biological Association Dunstaffnage Marine Research Laboratory P. 0.Box 3 OBAN, Argyll, PA34 4AD Scotland
	Dr. R.C.Dugdale University of Washington Department of Oceanography SEATTLE, Washington 98105 U.S.A.
	Dr. M.J. Dunbar Marine Sciences Centre McGill University P.O. Box 6070 MONTREAL, H3C 3G1 Canada
	Professor R. Marumo Ocean Research Institute University of Tokyo Minamidai, Nakano-ku TOKYO Japan
	Professor Petr. A. Moiseev AURI, All-Union Research Inst. of Marine Fisheries and Oceanography 17, Krasnoselskaya MOSCOW. B-140 U. S. S. R.
Ex officio:	Dr. G. Sætersdal Fiskeridirektoratets Havforskningsinstitutt Nordnæsparken BERGEN Norge
Adviser:	Dr. C. E. Lucas Department of Agriculture and Fisheries for Scotland Marine Laboratory P.O.Box 101 Victoria Road TORRY, Aberdeen Scotland

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
DIVISION OF ENVIRONMENTAL BIOLOGY

PROCEEDINGS

OF THE

INTERNATIONAL ASSOCIATION FOR BIOLOGICAL OCEANOGRAPHY

Volume 3

1 March 1976
Copenhagen, Denmark

CONTENTS

1. REPORT ON THE INTERNATIONAL ASSOCIATION FOR BIOLOGICAL OCEANOGRAPHY 1973 - 1975

1.1 Membership and National Correspondents

At 1 June 1973, IABO had formal contacts with biological oceanographers of 37 countries. Meanwhile contacts are being established with the following four additional countries: Belgium. Cuba, Indonesia, and the Philippines. In each of the countries one or more National Correspondents are expected to ensure close communication between IABO and the scientific community of the country. Circular letters have been sent to National Correspondents in June 1973 and in July and October 1975. Reports of National Correspondents are given below.

Since Dr. M. Ruivo resigned as the Secretary of the Advisory Committee on Marine Resources Research (of FAO), the Chairman of ACMRR, Mr. G. S. Sætersdal, has accepted to serve as an *ex-officio* member of the Executive Committee of IABO.

1.2 Executive Meetings

Members of the Executive Committee met in Paris in November 1973, in Copenhagen on 8 July 1974 and on 20 June 1975. In between, the president and secretary met on various occasions - particularly at IOC-Sessions - to discuss current activities of IABO.

The next General Meeting will take place during the Joint Oceanographic Assembly in Edinburgh, Scotland, on 21 September 1976. At the General Meeting, a new Executive Committee will be elected. The present president and secretary have announced their resignation.

1.3 Proceedings

The first issue of IABO Proceedings was published on 1 September 1971. the second issue on 1 June 1973. The present third issue was expected to be out in late 1975. Due to delays in the reporting of various symposia and other activities, publication was postponed until 1 March 1976. Reports on symposia and working groups which were co-sponsored by IABO were published in the Proceedings of SCOR and of ACMRR.

1.4 Working Groups

A status report of the activities of biologically oriented working groups of SCOR and ACMRR is given below. Those working groups were created in close cooperation and partly on the initiative of IABO. They were reviewed by SCOR and ACMRR at regular intervals. The president of IABO is an *ex-officio* member of SCOR Executive and attended its meetings.

IABO was also invited to cooperate with SCAR in its working committee on marine living resources of the Southern Ocean and with the Commission on Marine Geology (CMG) in the preparation of a symposium on the evolution of the Southern Atlantic, to be held in 1980. IABO established a permanent Coral Reef Committee as a follow-up of two international Coral Reef Symposia. The Committee is producing a handbook on coral reef research methodology and is preparing a further symposium which is scheduled for 1977 in Miami, Florida.

1.5 Symposia

IABO was represented and took active part in the following international symposia:

The Early Life History of Fish, Oban, Scotland, May 1973
Coral Reefs, Heron Island, Australia, June 1973
The Grey Mullet, Haifa, Israel, June 1974
The Upwelling Ecosystems, Kiel, FRG, August 1975

Furthermore regional symposia in biological oceanography, marine biology and related subjects were attended by IABO officers. At various occasions the affiliation to IABO of regional groups of biological oceanographers has been discussed.

During 1975 IABO officers were engaged in the preparation of the Joint Oceanographic Assembly (JOA) in Edinburgh, September 13-24, 1976. The JOA will consist of interdisciplinary General Symposia, some specialized Symposia on topics of wide interest, and finally poster and review sessions on contributed papers. IABO is represented at the Steering Committee of JOA and has contributed to the planning of the six General Symposia, each of which includes elements of biological oceanography: History of the Oceans; Ocean circulation and marine life; Natural variations in the marine environment; Man and the sea (e.g. fisheries, pollution, coastal engineering); New approaches in oceanography; Summary lectures (at the closing session).

The Special Symposia include amongst others the following: Paleo-oceanography; regional studies of dynamics and productivity (e.g. upwelling); depths of the ocean; oceanography and fisheries; controlled ecosystem experiments. Furthermore, IABO is arranging four sessions: two on contributed papers and one each on microbial processes of the sea floor and on dynamics of ecosystems.

1.6 Other matters

The major activity of IABO is in cooperation with non-governmental organizations of ICSU, in particular SCOR. The President and Secretary represented IABO at meetings of ICSU and TUBS. At these occasions they stressed the need for closer collaboration with the marine scientists in developing countries, and they assisted in the formulation of a resolution on the Freedom of Oceanic Research. IABO kept also close contacts to Unesco - particularly on matters of research on coral reefs, mangroves, and lagoons -, to FAO - in relation to pollution and ecosystem studies – and to ICES and IOC.

G. Hempel / T. Wolff

2. INCOME AND EXPENDITURE ACCOUNT OF IABO

1 January 1973 to 31 December 1975

	Income			Expenditure	
1973	Transferred from Scotland	D. kr. 2, 898.47	1973	Publication and shipment of IABO Proceedings vol. 2	D. kr. 4,388.73
	IUBS Grant	3,081.83		Postage	105.50
	Bank interest (15.1. - 20.12.)	199.16		Secretary travel to Ustaoset, Norway (IUBS)	1,564.50
				Balance	120.73
	As at 31 December 1973	D. kr. 6,179.46		As at 31 December 1973	D.kr. 6,179.46
1974	Brought forward	D.kr. 120.73	1974	Chairman travel Kiel-Copenhagen-Kiel and per diem 8. - 9. 7.	D.kr. 489.40
	IUBS Grant	3.269.25		Envelopes	136.46
	Bank interest	117.43		Provision	0.37
				Balance	2.881.18
	As at 31 December 1974	D.kr. 3,507.41		As at 31 December 1974	D. kr.3,507.41
1975	Brought forward	D.kr. 2.881.18	1975	Chairman per diem, meeting in Copenhagen 20.6.	D. kr. 280.00
	IUBS Grant	2.772.00		Stamps	505.50
	Bank interest per 20. 6.	137.79		Photo copies	65.00
	Bank interest per 20.12.	159.29		Duplicating paper and Envelopes	46.85
				Balance	5.052.91
	As at 31 December 1975	D.kr. 5,950.26		As at 31 December 1975	D.kr.5,950.26

(Signed) Torben Wolff, Secretary
Zoological Museum, University of Copenhagen
Universitetsparken 15, DK-2100 Copenhagen 0
Denmark

Audited and found correct:

(Signed) Bent Muus, Professor of Zoology
Zoological Museum, University of Copenhagen
Universitetsparken 15, DK-2100 Copenhagen 0
Denmark

3. LIST OF IABO NATIONAL CORRESPONDENTS

ALGERIA

Mr. Salah Tellai
Institut Océanographique
Jetée Nord
Alger

ARGENTINA

Dr. Esteban Boltovskoy
Museo Argentino de Ciencias Naturales
Bernardino Rivadavia
Av. Angel Gallardo 470
Buenos Aires

AUSTRALIA

Mr. David J. Tranter
CSIRO, Div. of Fisheries and Oceanography
Box 21
Cronulla, N. S. W.

BRAZIL

Professor A.B. Joly
Departamento de Botánica
Faculdade de Filosofia, Ciéncias e Letras
Universidade de Sao Paulo
Caixa Postal 8105
São Paulo

Mr. G. Vazzoler
Inst. Oceanografico da Universidade de Sao Paulo
Caixa Postal 9075
Sao Paulo

CANADA

Dr. Lloyd M. Dickie
Marine Ecology Laboratory
Bedford Institute
Dartmouth, Nova Scotia

Professor F.A. Aldrich
Department of Biology
Memorial University of Newfoundland
St. Johns. Newfoundland

CHILE

Dr. Luis Ramorino
Departamento de Oceanologia
Universidad de Chile
Casilla 13-D
Vina del Mar

DENMARK

Dr. Torben Wolff
Zoologisk Museum
Universitetsparken 15
DK-2100 Copenhagen

EGYPT

Dr. All M. El-Maghraby
Faculty of Science
Alexandria University
Alexandria

Dr. Youssef Halim
Department of Oceanography
University of Alexandria
Alexandria

FINLAND

Prof. Veikko Sjöblom
Finnish Game and Fisheries Research Institute
Pitkänsillanranta 1
SF-00530 Helsinki 53

FRANCE

Mr. P. Bougis
Faculté des Sciences
Station Zoologique
Villefranche-sur-Mer (Alpes-Maritimes)

Mr. E. Postel
Professeur associé d'Océanographie Biologique
Faculté des Sciences
Quai Dujardin
35 Rennes (Ille et Vilaine)

GERMANY, FRG

Dr. J. Kinzer
Institut für Meereskunde an der Universität Kiel
23 Kiel
Düsternbrooker Weg 20

Dr. Hjalmar Thiel
Universitat Hamburg, Hydrobiologische Abteilung
2 Hamburg 50
Palmaille 55

GERMANY. GDR

Professor E.A. Arndt
Universität Rostock, Sektion Biologie
25 Rostock
Freiligrathstrasse 7/8

GREECE

Professor Vassili Kiortsis
Zoological Laboratory and Museum
University of Athens
Panepistimiopolis (Kouponia)
Athens 61

ICELAND

Dr. Jakob Magnusson
Marine Research Institute
Skulagata 4
Reykjavik

INDIA

Dr. C.V. Kurian
University of Cochin, Dept. of Marine Sciences
Ernakulam, Cochin-682016

Dr. N.K. Panikkar, CSIR
Indian Programme, Internal. Indian Ocean Exp.
Rafi Marg
New Delhi

IRELAND
Dr. F.A. Gibson
Fisheries Division
Department of Agriculture and Fisheries
3 Cathal Brugha Street
Dublin 1

ISRAEL
Prof. B. Kimor
Israel Oceanographic & Limnological Research Ltd.
Haifa Laboratories
21, Hativat Golani Road
P.O.Box 1793
Haifa

ITALY
Prof. Bruno Battaglia
Istituto di Biologia Animate
Universita di Padova, La Cattedra di Zoologia
Via Lorcdan 10
1-35100 Padova

Prof. B. Schreiber
Istituto di Zoologia Universita
1-43100 Parma

Dr. Norberto Delia Croce
Istituto di Zoologia Universita
Via Baibi 5
1-16126 Geneva

JAPAN
Dr. Ryuzo Marumo
Ocean Research Institute
University of Tokyo
1-15-1 Minamidai, Nakano-ku
Tokyo

MEXICO
Dr. Jorge Carranza
Technical Adviser
Direcci6n General de Ensenanzas Tecnologlcas
Secretaria de Educacion Publica
Guatemala 10-501
Mexico 1, D.F.

MONACO
Dr. R. Vaissiere
Musée Océanographique
Monaco -Ville
Dr. Arthur Crovetto
Centre Scientifique de Monaco
16 Boulevard de Suisse
Monaco

NETHERLANDS
Prof. Dr. P. Korringa
Rijksinstitut voor Visserijonderzoek
Haringkade 1
Ijmuiden

Prof. Dr H.Postma
Nederl. Institut voor Onderzoek der Zee
Texel

NEW ZEALAND
Dr. D. E. Hurley
Assistant Director
New Zealand Oceanographic Institute
P.O. Box 8009
Wellington

NORWAY
Mr. Frederik Beyer
Universitetet i Oslo
Institutt for Marin Biologi og Limnologi
Biologibygget
Postboks 1064, Blindern
Oslo 3

Mr. 0.-J. Østvedt
Fiskeridirektoratets Havforskningsinstitutt
Postboks 2906
Bergen

PAKISTAN
Dr. M.S. Haq
Department of Zoology
University of Karachi
Karachi

PERU
Mr. Br. Romulo Jordan
Institute del Mar
Esquina Gamarra y General Valle
Chucuito
Callao

POLAND
Prof. W. Mankowski
Morski Instytut Rybacki
Zaklad Oceanografii
Aleja Zjednoczenia 1
Gdynia

PORTUGAL
Dr. Mario Ruivo
Secretaria de Estado das Pescas
Praca Duque da Terceira, 24/3'E.
Lisbon

Dr. R. Monteiro
Institute de Biologia Maritima
Cats do Sodre
Lisbon 2

SINGAPORE
Prof. Tham Ah Kow
Regional Marine Biological Centre
University of Singapore
Singapore 10

SOUTH AFRICA
Prof. John H. Day
Zoology Department
University of Cape Town
Rondebosch
Cape Province

Mr. H.J. van der Merwe
Secretary: SANCOR
CSIR
P.O. Box 395
Pretoria

SPAIN
Mr. F. Vives
Instituto de Investigaciones Pesqueras
Paseo Nacional
Barcelona (3)

SWEDEN
Dr. Armin Lindquist
Havsfiskelaboratoriet
S-45300 Lysekil

SWITZERLAND
Dr. Pierre Tardent
Zoologisch-Vergl. Anatomisches Institut
der Universität Zürich
Künstlergasse 16
CH-8006 Zürich

THAILAND
Dr. Arporna Sribhibhadh
Marine Fisheries Laboratory
89/1 Soi Sapanpla
Yanawa
Bangkok

UNION OF SOVIET SOCIALIST REPUBLICS
Dr. Constantin W. Beklemishev
Institut of Oceanology
USSR Academy of Sciences
1 Sadovaya, Lublino
Moscow J-387

Prof. Petr. A. Moiseev
AURI, All-Union Research Institute of
Marine Fisheries and Oceanography
17 Krasnoselskaya
Moscow B-140

Prof. Georgy V. Nikolsky
Institute of Morphology of Animals
USSR Academy of Sciences
33 Leninsky Prospect
Moscow

Dr. Mikhail E. Vinogradov
Institute of Oceanology
USSR Academy of Sciences
1 Sadovaya, Lublino
Moscow J-387

UNITED KINGDOM
Mr. B. B. Parrish
Marine Laboratory
P.O.Box 101
Aberdeen
Scotland

Mr. R.I. Currie
Director, Scottish Marine Biological Association
Dunstaffnage Marine Research Laboratory
P.O.Box 3
Oban, Argyll, PA34 4AD
Scotland

UNITED STATES OF AMERICA
Dr. K. Banse
Department of Oceanography
WB-10, University of Washington
Seattle 5
Washington 98195

Dr. J.D. Costlow, Jr.
Duke University Marine Laboratory
Beaufort
North Carolina 28516

Dr. George Grice
Woods Hole Oceanographic Institution
Woods Hole
Massachusetts 02543

4. WORKING GROUPS RELATED TO BIOLOGY

4.1 SCOR Working Groups (Notes from the SCOR Executive Meeting. November 1975)

Existing Groups (for Terms of Reference, see IABO Proc. 2: 10-11)

WG 36: Coastal and Equatorial Upwelling Processes (with ACMRR and ACOMR). The report on the 2nd meeting of WG 36 was published in SCOR Proc. 10, 2, Annex VIII. The 3rd meeting was held at Banyuls sur Mer from 8 to 11 September, 1975. The report of the meeting will be published by SCOR. The SCOR Executive Committee expresses interest in the proposal to hold the Fourth Upwelling Ecosystems Analysis Symposium in 1978 in Peru.

WG 42: Pollution of the Baltic (with ICES. IAPSO, and IABO). The Joint Working Group on the Study of Pollution of the Baltic held a meeting in Charlottenlund, Denmark, 18-19 June, 1976.The group had reviewed the present state of knowledge and also the need to avoid any duplication of activities by a group set up by the Helsinki Convention.

Extracts from the report will be published in the SCOR Proceedings. The full report to be published by ICES. The next meeting of the group will take place in Tallinn in May 1976 at the invitation of the Estonian Academy of Science.

WG 46: River Inputs to Ocean Systems (with ECOR, LASH, ACMRR, and Unesco).
The report of the 1st meeting of WG 46 was published in Scor Proc. 10, 2, Annex XIV. The Group met in New Haven in March 1975. The report contains the group's proposals for future activities, which include (Phase I) a review of ongoing research activities, (Phase II) a workshop on the subject to be held in the UK in September 1976, and (Phase III) the establishment of three field stations on the mouths of major rivers. On the advice of IABO, Dr. S. 0. Stanley (UK) had been appointed as a sediment microbiologist to join the Working Group.

WG 50: Biological Effects of Ocean Variability (with ACMRR, IAPSO, and IABO).
Terms of Reference: To review data from biological monitoring programmes and those to ocean climatological data. from the same regions and periods, to consider the synthesis of such data and the hypotheses that could be erected to account for the observed interactions, and to assist in the organization of a Special Symposium for the JOA in which selected case studies of the interactions between environmental changes and those in the distribution and abundance of fish stocks or other organisms could be presented.
Members: A. Longhurst, UK (Chairman); D. Cushing. UK; 0. Dragesund, Norway; J. Namias, USA; P. Smith, USA; R. Le Brasseur. Canada.
This group is engaged in preparations for a symposium at the Joint Oceanographic Assembly. A report on the first meeting in Guayaquil in December 1974 is given in SCOR Proc. 10, 2, Annex XV.

New Groups, not yet established

WG 52: Estimation of Micro-Nekton Abundance (with ICES, SCAR, ACMRR, and IABO).
Terms of Reference: To compile and review information on methods for assessing presence, vertical distribution and species composition of micro-nekton, particularly krill and juvenile stages of fish and squid; to review possibilities for quantitative estimates of micro-nekton abundance by acoustic methods and net sampling; to prepare a manual on recommended methods for estimating and sampling micro-nekton.
Members: The membership of the group will be discussed together with ACMRR, ICES, SCAR, and IAB0.

WG 53: Evolution of the South Atlantic (with CMG, ICG, IAPSO, and IABO)
Terms of Reference: To stimulate scientific preparation for and to organize a symposium to review and critically evaluate the status of knowledge and interpretation of data relating to the origin and evolution of the floor and margins of the South Atlantic between South America and Africa; to consider also the concomitant effects upon changes in ocean circulation and life.
Chairman: E.S.W. Simpson, South Africa. Members: Membership to be established.
The Symposium should take place not later than 1980.

WG 54: Living Resources of the Southern Ocean (with SCAR, ACMRR, and IABO). SCOR had been invited by SCAR to collaborate in and cosponsorthe SCAR group of specialists on Marine Living Resources of the Southern Oceans.
Terms of Reference: To assess the present state of knowledge of the Antarctic marine ecosystem from the point of view of structure, dynamic functions, and biomass of the organisms at different trophic levels; to encourage and stimulate investigations of the ecology and population dynamics of the organisms at different trophic levels with particular reference to krill. squid, fishes, and whales; to maintain liaison with FAO; to advise SCAR and SCOR and through them other international organizations and in particular to respond to relevant recommendations, conveyed to the group by SCAR or SCOR, of IOC and the Antarctic Treaty Consultative Meetings.
Members: The current membership of the group is as follows: Dr. S. Z. El-Sayed, USA (Convenor);
Dr J.C. Hureau, France; Prof. G.A. Knox, New Zealand; Dr. R.M. Laws, UK; Dr. T. Nemoto, Japan; Dr. G.G. Newman, S.Africa; Dr. D. B. Siniff, USA; Dr. A. P. Tomo; Prof. G. Hempel (IABO nominee); Dr. J.A. Gulland (ACMRR nominee).

Further proposals for Working Groups

a) Statistical treatment of plankton samples.
b) Modelling of Marine Ecosystems.
c) Biochemical and other methods for determining production at higher trophic levels.

The SCOR Executive Committee invited IABO to consider these proposals and advise SCOR at its next meeting in Edinburgh, September 1976.

4. 2 ACMRR-IABO Working Groups

WP on Aquaculture. After its first meeting, a preliminary report was prepared which aimed at the planning of the World Aquaculture Conference, Kyoto, May 1976. Meanwhile members of the group have been active in further scientific preparations for the Conference. ACMRR decided to hold the WP in suspension until after the Aquaculture Conference after which its future should be reviewed by the Committee.

IABO is also directly or indirectly involved in the
WP on Biological Effects of Pollutants
WP on Biological Accumulators
WP on Ecological Indices of Stress to Fisheries
which are all supported by UNEP. ACMRR anticipates that the three working parties would complete their work in the near future and that they would then be disbanded.

5. REPORTS ON SYMPOSIA AND CONGRESSES 1973-1975

Symposium on Early Life History of Fish, Oban. Scotland, 17-23 May 1973
Plans for an International Symposium on the Early Life History of Fish were first discussed in 1967 at the FAO Advisory Committee on Marine Resources Research (ACMRR). It was considered that studies on fish eggs and larvae were of value in estimating the size of fish stocks, in appraising the stock-recruitment relationship, and in helping to answer questions on the systematics and taxonomy of fish.

An ACMRR Working Party recommended in 1969 that a Symposium should be held and after discussion with IABO Dr. J.H.S. Blaxter of the Scottish Marine Biological Association (S.M.B.A.) agreed to convene the meeting with the help of a steering committee. Various international agencies were interested in the meeting and agreed to sponsor it in various ways. These agencies included FAO, IABO. ICES, and SCOR. In the final event FAO supported the meeting by publishing the abstracts beforehand, providing travel funds for participants, and publishing a report after the meeting. IABO and SCOR provided travel funds and the Royal Society of London and S.M.B.A. finance for local expenses. Without this financial help the Symposium would have been very much less successful.

A Steering Committee was set up in 1972 which consisted of the following members:
Convenors: Dr. J.H.S. Blaxter (UK), Prof. G. Hempel (FRG, IABO representative). Prof. S. Tanaka (Japan, ACMRR representative). Committee: Dr. E. H. Ahlstrom (USA), Dr. D.F. Alderdice (Canada), Prof. 0. Dragesund (Norway, ICES representative). Dr. E. Fagetti (FAO). Prof. C. Hubbs (USA), Dr. R. Lasker (USA), Mr. 0. Ledoux (France). Prof. K. Lillelund (FRG). Prof. T. Rass (USSR), Dr. W.J. Richards (USA), Mr. A. Saville (UK).

With their help the Symposium was organized and then held from 17 - 23 May. 1973. at the Dunstaffnage Marine Research Laboratory in Oban, Scotland. About 160 participants from 26 countries attended to hear 62 papers arranged in plenary and parallel sessions.

The proceedings of the Symposium were published in full by Springer-Verlag during the early summer of 1974. The dominant theme of these papers was the use of egg and larval surveys in fish population dynamics. It seems to be generally accepted that high mortalities in these early stages are an important factor in determining the future brood strength and success of a year-class, and thus the recruitment to the fishery. High mortalities of eggs were reported in a number of species which seems to be explained by imperfections in development rather than by predation or current systems carrying the eggs out of the area. After hatching, losses due to predation and starvation are heavy and many larvae are small, requiring food of very small size. Attempts have been made to quantify the nutritional status of larvae to see whether sea-caught larvae are viable and whether the weaker ones are selectively sampled by plankton nets. Additional mortality due to the delicate integument and general fragility of larvae may follow from unsuccessful strikes by predators.

The Symposium showed that our knowledge of micro-distribution is also inadequate. Many plankton nets filter large quantities of water and are not equipped with closing devices to limit the depth of sampling. Larvae make small-scale horizontal and vertical migrations, and some initial evidence is also available that larvae may aggregate on small food particles. A re-shaping of ideas on larval distribution may emerge from the Symposium.

Much more is now known about the tolerance of eggs and larvae to such harmful factors as high temperature, low oxygen, HgS, and heavy metals. These data are helpful in assessing losses due to entrainment in power station cooling

systems and the possibility of exploiting heated effluents in aquacultures. The improvement in culture techniques of late has been remarkable. New sources of small food organisms, the possibility of micro-encapsulation of food and the advances in husbandry generally mean that it will soon be possible to rear most species from the egg, given adequate finance. It is still not clear, however, whether larvae can utilize dissolved organic matter (Pütter's Theory).

One of the main existing needs is the production of mature parent fish on demand. The use of appropriate regimes of temperature and photoperiod and of hormone injections may help to solve this problem. In the field of aquaculture, a new form of research is being developed on hybridisation and other types of genetic manipulation which may lead to improved growth and viability.

Taxonomic studies also occupied a part of the Symposium and it is clear that even now the larvae of many fish are not well-known. This is partly due to the multiplicity of species but also to the tendency for larvae to show smaller morphological distinctions than adults. Perhaps this is the most neglected of the fields covered by the Symposium.

The published proceedings of the Symposium should be useful in representing the current status of research into marine fish eggs and larvae. The coverage of the various branches of the research was wide and the presence together of so many of the active research workers provided an excellent opportunity to crystallize opinion and plan for the future.

J.H.S. Blaxter
Oban, Scotland

IBP/PM International Symposium on the Grey Mullets and Their Culture. Haifa, Israel, 2-8 June 1974

After more than two years of organizational effort, the International Biological Program (Productivity Marine) International Symposium on the Grey Mullets and Their Culture convened on 4 June 1974 and co-sponsored also by IABO, UNESCO, FAO, IFS, Israel National Council for Research and Development, Israel Academy for Sciences and Humanities, the Israel Oceanographic & Limnological Research Ltd. , the Fish Breeders Association in Israel, etc. Almost 50 scientists from 23 countries and more than 70 scientists, fish farmers and fish farming instructors from Israel participated. Unfortunately, an additional 15 to 20 scientists, from Africa, South and Central America and Southeast Asia, could not take part, chiefly due to lack of funds.

The approximately 50 papers presented during the Symposium showed the wide interest in in the specific theme discussed - the Mullets. Six of the papers were grouped under the heading Taxonomy, including one on osteology, one on the dentition in adult mullets, and one describing the use of disc electrophoresis in taxonomic studies of Mullets. The 12 papers on Resources and Biology of Mullets reflect the knowledge recently acquired in many parts of the world. Three papers dealt with the problem of Young Fish, their capture, transportation and diet. In three further papers, the Fishable Resources of Mullets were discussed. The main topic. Artificial Reproduction in Mullets, attracted the largest audience to the eight papers read. Ten papers dealt with the Cultivation in different waters and under different conditions. Two papers discussed Parasites and Diseases, and the remaining papers considered other aspects of Mullet studies.

A considerable effort has been put into the three main research subjects: a) Resources and Biology of Mullets; b) Mullet Culture; and c) Artificial Propagation in Mullets.

The recent disappearance of fry from many coastal waters and estuaries is usually caused by Man himself: the pollution of coastal waters and estuaries by domestic and industrial waste, as well as by oil and thermal pollution. Sometimes, thermal pollution can be of good use, but not other types of pollution.

Because of the disappearance of fry from coastal waters, the most important section of the Symposium was the one dealing with the problems of artificial reproduction, and the rearing of Mullet fry, with the basic understanding of the processes taking place in the reproductive organs, and the understanding of the environmental factors which influence these processes.

Much is known about many aspects of the Grey Mullet life cycle, but little is known about its eggs, larvae, and post-larvae, and about the feeding of the young stages. The knowledge of the food of the very early stages of the larvae, after the yolk has been consumed, is extremely important, but no paper was presented on this subject, and only one paper dealt with the food of post-larval stages and small fry. The feeding of the young was inadequately covered. As yet, there are many unsolved problems concerning artificial reproduction (which succeeded only in a few localities on a broad scale). Artificial reproduction is bound to become general practice in the not-too-distant future, when substantial progress will be made on the problem of nutrition of post-larvae and young stages of Mullets. Then greater efforts will have to be invested in solving problems of fish diseases and parasites.

The encouragement given to studies dealing with larval survival indicates that this should become the main topic of the next Symposium. And, at the probable third Symposium on Mullets, the main topics will deal with parasites, diseases, and economics. A proposal made during the general discussion at the Symposium was not only to continue the support of Mullet studies, but also to stress studies on Chanos chanos and other fish, which are of wide geographical distribution and economic importance in polyculture. This proposal should be endorsed by IABO, and a possible second Symposium should be organized during 1976 or 1977. This should enable scientists dealing with other species of fish to join in the next Symposium. No doubt, the experience gained with one species would be very useful for the understanding of others.

It is obvious that coastal waters, lagoons, marshes, estuaries, bays, even the coastal areas of the sea, etc. , must be made into more intensive, protein producing areas. One must introduce technologies that will enable Man to make the most of his environment, without harming it. The greatest handicap to achieve even part of our goal is the lack of trained personnel and the lack of centers of specific studies in the field of aquaculture.

Everybody is talking about the protein food shortage. Many think that aquaculture can offer a partial solution to the problem, particularly in areas where water and land exist in surplus. Such areas are situated mainly in developing countries, where funds and professional manpower is inadequate and where the food is most needed.

IABO should become actively engaged in promoting marine and brackish water aquaculture research in close collaboration with FAO Fisheries Department and take over IBP/PM's activity in this field.

The greatest part of the papers presented at the Symposium has already been published in AQUACULTURE Vol. 5, Nos. 1-4, and Vol. 6, No. 1. Some additional papers were published in BAMID-GEH, Israel Journal for Fish Culture.

0. H. Oren
Haifa

Third SCAR/TUBS Antarctic Biology Symposium. Washington, D.C., U.S.A., 26 - 30 August 1974

The Third Symposium on Antarctic Biology was cosponsored by the Scientific Committee on Antarctic Research (SCAR) and the International Union of Biological Sciences (IUBS). The Symposium's theme was "Adaptations within Antarctic Ecosystems". Representatives from the 12 SCAR nations (Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the Soviet Union, the United Kingdom, and the United States) and invited speakers from Canada and FAO presented 76 papers (including seven invited review papers). About 200 scientists and observers participated in the symposium's nine sessions.

The third Antarctic Biology Symposium's general theme reflected a change in Antarctic biological research. Instead of reconnaissance and descriptive ecology, emphasis now is on quantitative ecology, resource management, and population, behavioral, and physiological studies. This new emphasis is aimed at understanding how antarctic organisms adapt to their individual ecosystems, and at elucidating the energy and nutrient cycles of selected ecosystems.

The symposium's general theme was organized into four sub-themes representing major areas of recent biological research. The subthemes were: 1) structure and function of marine ecosystems; 2) structure and function of freshwater and terrestrial ecosystems; 3) development and evolution of antarctic ecosystems; 4) ecosystem evaluation, modeling, monitoring, and management.
In his opening remarks, George A. Knox, convenor of the symposium and chairman of the SCAR biology working group, stressed that antarctic biology, having reached a crucial stage, will become increasingly important during the next ten years: "There's no doubt that we will see increasing exploitation of antarctic resources; not only living resources of the antarctic oceans, fish and krill in particular, but . . . the exploitation of mineral resources. This will pose considerable problems in antarctic conservation, and antarctic biologists will be deeply involved in seeking answers and in providing knowledge that will be necessary in order to avoid any unnecessary damage to the resources of the Antarctic. "

G.A. Knox
University of Canterbury
Christchurch

Symposium on Marine Plankton and Sediments. Kiel, Germany (FRG), 9 - 13 September 1974

The Symposium was held at the Kiel University. It was preceded by meetings of Consultant Groups with some 100 participants, 5-8 September 1974, on Planktonic Foraminifera (Chairman: Takayanagi, Japan; Vice Chairman: Olsson, USA), Pteropods (Lalli, Canada), Radiolarians (Petruschevskaya, USSR; Cachon, France), Diatoms (Schrader,

F.R.Germany; Burcle, USA), Silicoflagellates (Ling, USA), Dinoflagellates (Taylor, Canada; Rossignol-Strick, France), and Coccoliths (Perch-Nielsen, Switzerland; Noel, France). Combined with this Symposium was the Third Planktonic Conference and the Third Symposium on Recent and Fossil Diatoms.

During the five morning sessions 20 invited lectures of general significance were presented. Demonstrations, special meetings and informal discussions occupied the middle part of the day. About 130 special lectures were held in four parallel sessions in the afternoon.

The Symposium was organized by Professor E. Seibold, F. R. Germany, Chairman of SCOR Working Group 37. It was cosponsored by Unesco -Division of Oceanography, Commission of Marine Geology, IUGS, Deutsche Forschungsgemeinschaft and Kiel University.

Approximately 340 scientists (including some Kiel University students) participated. Especially appreciated was the opportunity provided for intensive discussions between botanists, zoologists, biological oceanographers, and paleontologists working on the same planktonic groups.

It is planned that the invited lectures together with the recommendations of the consultant groups will be published as a special volume by Micropaleontology, New York.

B. Zeitzschel
Kiel

International Symposium on Mangrove Biology and Management. Honolulu, Hawaii, 5 - 8 October 1974

The Symposium was organized by Dr. H. Teas, Dr. G. Wash, and Dr. S. C. Snedaker, all from Florida, and took place in the East-West Center, Honolulu. Seventy-one scientists from 19 countries took part in the discussions. The proceedings were published in early 1976.

The opening session dealt with factors affecting distribution. It was reported that even within subtropical latitudes the distribution of mangals or individual species is often restricted by low winter temperatures, arid conditions or unsuitable soils, but the virtual absence of mangals from many Indian shores is due to human destruction or foraging by goats and camels. In local areas, heavy wave action or the absence of tidal range prevents the development of mangals, and the distribution of individual species is determined by tidal levels, the pH of the soil and the presence of H_2S.

In the next sessions Dr. Steinke and Dr. Kolehmainen related distribution to the factors affecting germination and {he distribution of propagules. Salinity tolerance was related to osmotic pressure in the transport systems, and ultrafiltration in the roots or salt glands in the leaves of some species. The importance of tidal range was correlated with oxygen absorption by pneumatophores. This led on to discussions of stomatal control, photoperiod and photosynthetic pathways by Dr. Joshi and Dr. Miller. An interesting account of nutrient requirements, ion uptake and the recycling of nitrogen compounds led up to estimates of growth rates and productivity. Dr. Clough estimated that in South Australia mangrove productivity is 23.2 kg/m^2, which is 24 times that of phytoplankton in oceanic areas. Much work on litter production has been done in Florida, where Dr.Pool estimated a productivity of 1.2 to 2.9 g dry $weight/m^2$ as compared to 1.7 to 3.5 g in Puerto Rico. Dr. Fell outlined the slow breakdown of litter carbohydrates by fungi and bacteria, during which there is an initial increase and eventual decrease in nitrogen content of the detritus. The whole process of decay takes about 115 days, and the detritus is eventually taken up by the microfauna or transported to the lagoons or neritic seas where it provides the basis of rich fisheries.

There was general agreement that plankton is not important in the economy of mangals. Gastropods and crabs are the dominant elements of the macrofauna, and their distribution in relation to salinity and tidal levels in Moçambique, Puerto Rico and Fiji was described.

Dr. Master opened the session dealing with the destruction of mangroves with an account of the use of herbicides during the war in South Vietnam, and Dr. Teas described the physiological effects of these compounds. The most serious destruction of mangals apart from the uncontrolled felling of trees is the draining of mangals to grow crops or to build marinas. This is happening in Florida, Puerto Rico, El Salvador, India, Southeast Asia and Queensland. There was wide agreement that such destruction causes a decline in the macrobenthos, and an impoverishment of prawn and fish populations in nearby bays and lagoons.

The final session dealt with the uses and management of mangrove ecosystems. It had been reported earlier by Dr. Moorman and Dr. Pons that mangrove soils are usually acidic and highly saline. As a result the yield of rice or cotton is very low, and normal fertility may take up to 50 years to develop. Economically such soils are more valuable for coconut farming or aquaculture or forest products, depending on the skills and requirements of the local population. Strict control is essential, and there is an urgent need for co-ordination of legislation and administration over the whole drainage basin.

At the end of the Symposium Dr. Chapman proposed, and the Symposium unanimously adopted, the following resolution to UNO:
"The first International Symposium on Mangroves recognises that the world's mangrove ecosystems are valuable resources which vary according to regional and local situations and needs, and therefore recommends that governments be urged to actively promote research to better appraise these ecosystems and in the meantime to exert special care when evaluating actions or proposals that could commit these resources."

Research Priorities

After the Symposium, Dr. Day organized an informal discussion to determine what researches should be recommended to SCOR. The five projects below are some of the main ones proposed:
1. The distribution, nature and species composition of the larger mangals in relation to geomorphology, climate, tidal range and shelter from wave action.
2. The potential growth rate and productivity of dominant mangrove species in relation to salt tolerance, photoperiod and nutrient requirements and the relation of actual to potential productivity in different environments.
3. Determination of the biomass of the macrofauna consuming mangrove products both within mangals and the channels, lagoons and seas into which mangrove products are transported.
4. The energy budget between mangroves and consumers dependent on them.
5. A cost-benefit analysis of mangroves or lands reclaimed from mangroves in different countries with due regard to the social structure of the local community.

J.H. Day
University of Cape Town

Symposium on the Changes in the North Sea Fish Stocks and their Causes. Århus, Denmark. 9-12 July 1975

After four years of planning and preparations the Symposium was opened by the President of the ICES at Århus University. About 100 participants were gathered to discuss 44 papers which provided a very comprehensive picture of the present state and the postwar developments of North Sea fish stocks and their environment.

The first day was devoted to changes in the abiotic and biotic environment. Eutrophication by pollution was considered as a possible cause of increased production only in near-shore parts of the southern North Sea. Climatic changes seem to have influenced composition of phyto- and zooplankton and possibly distribution of fish. The second and third days were mainly devoted to a detailed description of the changes in the major fish stocks in the North Sea. Within the 1960's total landings from the North Sea doubled. the increase being due partly to intensive fishing on "new species" like Norway pout and sand-eel, partly to extensive exploitation of herring and mackerel in the northern North Sea, and partly to an increase in the stocks of gadoids and flatfish. In most recent years low yield in pelagic species (except sprat) and some decrease in the cod and haddock landings were compensated by a further increase in the yields for industrial purposes which reached over 2 million tons in 1974, including 750.000 tons Norway pout and 500.000 tons sand-eel. Very likely those stocks became more abundant in the last decade.

The recruitment in the 1960's in cod and haddock tripled compared with the 1930's and the variance in year class strength increased. Except for the very strong year classes in haddock, juvenile growth was better in recent years in spite of the higher density in the gadoid stocks. Possible causes for those drastic changes were discussed in detail. It was concluded that changes in food supply and predation at the early life history stages might have played the key role for the increments in growth and recruitment. The hypothesis was put forward that the drastic decline in herring and mackerel was at least partly responsible for improved living conditions for young gadoids and that fast-growing, short-lived fish with higher ecological efficiency took the place of the slower growing (but higher priced) species which altogether caused a higher productivity of the total fish population in the North Sea. The discussion on the relative importance of environmental effects versus overfishing has changed, since the interest of fishery biologists focussed on the early life history of fish and on the building of multispecies models. Those studies require a detailed knowledge of food and feeding behaviour, competition, predator/prey relationships, cannibalism, epidemic diseases and parasites during the first year of life. Longterm oceanographic monitoring of a few selected stations as well as continuation and improvements in the Plankton Recorder Programmes seem important, parallel to extensive sampling programmes of fish, mainly by research vessels. The papers are being published in a special volume of Rapports et Proces-Verbaux.

G. Hempel
Kiel

Third International Symposium on Upwelling Ecosystems. Kiel. Germany (FRG), 25-28 August 1975

Following the first two meetings in Barcelona (1970) and Marseilles (1973) the Third International Symposium on Upwelling Ecosystems, held at the University of Kiel, was prepared and organized by Professor Hempel assisted by his co-workers Dr. Boje and Dr. Tomczak Jr. from the Institut für Meereskunde. This symposium was attended by nearly 150 participants representing the various countries involved in national and international Upwelling research programmes. These symposia are now well established and are devoted to following the progress accomplished by an increasing number of studies on Upwelling processes. In order to review the main aspects of work and concepts concerning the processes and associated biological phenomena, the organization committee had proposed a series of invited lectures on 12 various topics; there were initially several classical themes: phyto- and zooplankton communities and their productivity, relationships with higher trophic levels, mathematical models both on physical and biological processes. The role of trace metals on growth rates of phytoplankton and the biological conditioning of upwelled water was again examined. Additionally, participants heard information about the geological and geochemical characteristics of their particular upwelling areas presented by the lecture "Benthos and sediments in upwelling areas".

Extensive research in upwelling areas off the coasts of developing countries introduces new criteria of fertility, which have to be considered in the new legislation of the "Law of the Sea Conferences". The relationships of upwelling research with a great variety of economical and political activities have been given by Dr. W. Wooster.

Microbiological studies, which have to be developed in the future, were summarized and recent results show a surprisingly high microbial biomass and activity. From the 65 announced and, with a few exceptions, presented papers, nearly half were on physical oceanography. This increasing number showed the interest of physical oceanographers and demonstrated the interdisciplinarity concept of this symposium. Thus, the inevitable parallel sessions of the fourth day did not separate biologists from physicists, but were devoted to different aspects of regional oceanography. The greatest part of the contributions concerned main upwelling areas: Peru, Oregon, and N. W. Africa, the latter being the best known upwelling region. According to the international programme CINECA, large scale survey and upwelling process studies have been done during several years.

Most of the results of the U.S. contribution to the largest upwelling research group (CUEA: Coastal Upwelling Ecosystem Analysis) to the CINECA Programme were presented in Kiel. A three-ship expedition over several months in early 1974 (JOINT I) was devoted to the study of the Cape Blanc upwelling area.

If one considers that the study of an upwelling ecosystem includes most oceanographical processes (wind field - vertical motion and nutrient transport - energy flow through the complete food chain) such a conference enabled a juxtaposition of results of each research field. It appears that between highly sophisticated modelling and simple observational facts, a large field remains where studies of subsystems, as pointed out by Boje and Tornczak, should be considered.

The symposium provided a series of presentations and often too short discussions about interesting facts and dynamic considerations of the upwelling ecosystem:

> Circulation patterns of the NW African upwelling system showing alternatively two types of circulation: upwelling at the coastline (one cell circulation) or at the shelfbreak (two cell circulation).
>
> Distribution patterns of zooplankton (small forms on the shelf, large species on the shelf-break and offshore) were controlled by the circulation system and depended on the characteristics of the complete life cycle of the species.
>
> Ammonia distribution showed a subsurface layer characteristic of the one cell circulation. Its excretion by zooplankton and fish and its uptake by phytoplankton have been studied. Special attention has been given to the role of the large colony-forming diatom *Thalassiosira partheneia*.
>
> The main reason why the Peruvian area is richer in terms of fish in comparison to NW Africa is the higher assimilation ratio related to a higher nutrient level.
>
> There is evidence that biological more than physical features characterize different areas.

Future work will probably remain in the same coastal waters, but special efforts will be oriented to large scale studies and surveys of offshore upwelling zones, particularly the equatorial upwelling systems, both in the Pacific and Atlantic oceans. More emphasis will again be given to the Peruvian upwelling in connection with special attention to the "El Nino" phenomenon.

J. Minas
Marseille

Circumpolar Conference on Northern Ecology. Ottawa. Canada, 15-18 September 1975

The conference was organized by the National Research Council of Canada in association with the Scientific Committee on Problems of the Environment. The conference was opened by the General Chairman, Professor M. Dunbar, in the "Government Conference Centre" in Ottawa.

The papers were divided into four sessions: Terrestrial Ecology, Freshwater Ecology, Marine Ecology, and Bioclimate. The programme and 53 abstracts were published in a book available at the start of the conference. In order to speed up the dissemination of the information presented, the manuscripts were handed over to the secretary ready for printing before the end of the conference. About 200 scientists attended the conference.

The conference gave an excellent opportunity to get an impression of the ecological research going on in the northern areas, especially Alaska, Canada, Greenland, and Scandinavia. This research is today highly influenced by the problems of environmental impact and pollution.

Mrs. Rosali J. Tizya from the Indian Brotherhood of the N.W.T. gave a special evening lecture on "Northern Scientific Research as Viewed from the Community's Perspective". This lecture taught the scientists that the development and research in the North cannot be viewed from ecological and economic standpoints alone.

The conference was concluded by a panel discussion on "The Next Phase in Northern Ecological Research", with M.J. Dunbar, I. Hustich, W. Osburn, and G.H. Petersen in the panel.

The lectures:
1. Terrestrial Ecology - Invited Papers:

L.A. Viereck	The Forest Ecology of the Alaska Taiga.
G.W. Scotter, E.S. Telfer	The Potential for Red Meat Production from Wildlife in Boreal and Arctic Regions.
E. Gourdeau	Civilization. Economy and the Canadian Northern Environment – Some Perspectives for Reconciliation.

Twenty Contributed Papers were read in this session.

2. Freshwater Ecology - Invited Papers:

D. Gill	Man's Potential Impact on Northern Alluvial Ecosystems.
G. Brunskill	Predictive Aquatic Ecology - Limnology and the MacKenzie Pipeline.
G. Persson	Comparative Limnology and Lake Manipulation in Subarctic Sweden.
F.H. Rigler	Lessons from the Char Lake Project.

Eight Contributed Papers were read in this session.

3. Marine Ecology - Invited Papers:

G.H. Petersen	Present and Planned Ecological Activities in Greenland.
R.J. Menzies	Origin and Evolution of the Arctic Marine Ecosystem.
D.E. McAllister	Ecology of the Marine Fishes of Arctic Canada.

Nine Contributed Papers were read in this session.

4. Bioclimate - Invited Papers:

R.A. Bryson	The Significance of Climatic Change in the Canadian North.
G.M. Courtin	Micro-environmental Studies of a High Arctic Coastal Lowland, Devon Island, N.W.T.
P. Kallio	Climatic Adaptation of Plants to the Polar Forest Border in Fennoscandia.
W.R. Rouse	Energy Budgets Over High-Latitude Surfaces.

Three Contributed Papers were read in this session.

The lectures and the panel discussion will appear in a special publication.

G. Høpner Petersen
University of Copenhagen

[Original p. 17]

Fourth Symposium of the Baltic Marine Biologists. Gdansk, Poland. 13-19 October 1975

Against previous announcement the symposium was held at Gdansk instead of Gdynia. A total of over 150 scientists, most of them from the organizing country, attended some 60 lectures. Unfortunately, there were no participants from the Soviet Union. The symposium intended to give a survey of marine biological and chemical research during the last

two years on: 1) Production, circulation, and disintegration of organic matter within both natural and polluted marine environments; 2) Life cycles and population dynamics of certain Baltic organisms being considered of relatively great importance.

Generally, an inclination towards production studies of individual species of major importance in the ecosystem could be noticed, partly with field experimental designs. On the other hand, the "first step" (Jansson) in Baltic ecosystem research - description of the structural status quo as a basis for model studies of the dynamics - has taken longer than it was assumed a few years ago. The intercalibration work on gears and methods carried out by different working groups has resulted in a number of recommendations to be published in a manual. Some of the groups could be dissolved, giving place to others which are to tackle special problems rather than developing methods. There was a general feeling that the numbers of lectures (20 per congress day) was too high and that in future symposia there should be some alterations concerning the kind and number of talks presented.

The fifth Symposium - in 1977 - will be held at Kiel (FRG).

Wolf Arntz & Heye Rumohr
Kiel

6. FORTHCOMING SYMPOSIA, MEETINGS. ETC.

International Symposium on the Ecology and Management of Some Tropical Shallow Water Communities. Jakarta and Ujung Pandang Island. Indonesia. 27 June - 11 July 1976

Sponsored by the Western Society of Naturalists, USA, and the Institute of Sciences, Indonesia, the symposium is being called to learn more about the ecology of shallow water communities in order to develop plans for a rational use of their resources.

The rapidly accelerating pressures of population growth, oceanic and terrestrial development and maximum utilization of resources may endanger the future of the Pacific Basin flora and fauna. Such disrupting aspects as population growth, development and utilization mandate ongoing analysis of the organisms involved.

Marine and freshwater scientists are invited to participate in this attempt to add to the knowledge of these valuable resources. Further information may be obtained from: The Western Society of Naturalists, Prof. David H. Montgomery, Secretary, Biological Sciences Department, Calif. Polytechnic State University, San Luis Obispo, Calif. 93407, U.S.A.

First Interdisciplinary Conference on Marine and Freshwater Research in Southern Africa. Port Elizabeth. South Africa, 5-10 July 1976

Organization and sponsorship: The Conference is being sponsored and organized by a joint organizing Committee oflhe South African National Committee for Oceanographic Research (SANCOR), the South African Committee for the Engineering Committee on Oceanic Resources (ECOR), the Limnological Society of Southern Africa (LSSA) and the National Programme for Environmental Science (NPES) in collaboration with the University of Port Elizabeth and the Council for Scientific and Industrial Research (CSIR).

Objective and attendance: To bring together people working in these fields for an interchange of knowledge and ideas on an interdisciplinary basis. All scientists engaged or interested in marine and/or freshwater research in Southern Africa.

Papers and programme: The technical sessions of the Conference will be divided into plenary, poster and workshop sessions.

Plenary sessions: During the daily plenary sessions, invited speakers will deliver review papers of importance to research in Southern Africa on: Ocean engineering. Design of ocean structures. Estuary hydrodynamics. Water research. Freshwater biological research, Hydrological research. Fisheries biology. Marine geology and geophysics. Ocean basin formation. Physical oceanography, Ocean modelling. Marine biology. Limnology. Biology of estuarine fishes.

Poster sessions: Provision is being made for all contributed research papers to be presented during poster sessions.

Workshop sessions: In addition to invited plenary papers and contributed papers to be presented at poster sessions, about 15 workshop sessions are being arranged.

Payments: The Registration Fee for the Conference is R20,00 per person which entitles delegates to a full set of documents, morning and afternoon teas and luncheons at the venue as well as the social functions. Cheques/bank drafts should be made payable to CSIR S.122 and should reach the Conference Secretariat before 30 May 1976.

Conference Secretariat: Conference and Liaison Service S.122, CSIR, P.O. Box 395, Pretoria, South Africa 0001. Tel: 74-6011 x 2077 (Mrs de Havilland), 74-6011 x 2070 (Miss Ruane).

CICAR-II Symposium: Progress in Marine Research in the Caribbean and adjacent Regions. Caracas, Venezuela, 12-16 July 1976

Eight sessions, including both invited and contributed papers, will be held on the following subjects: Marine geology and geophysics, Marine fisheries, Marine biology, Meteorology and sea-air interaction. Marine chemistry. Physical oceanography. Marine fisheries resource research. Interdisciplinary research.

All investigators who have participated in research conducted under the CICAR program are invited to submit papers to the CICAR-II Steering Committee, which will select those to be presented orally at the symposium. Fifteen minutes will be allotted for each paper, plus a question period, and those not accepted for presentation will be summarized by the convenor of the appropriate session. Abstracts, not exceeding 250 words, should be submitted to the steering committee in both English and Spanish as soon as possible and no later than 15 January 1976.

The bilingual abstract volume (English/Spanish) will be available to all symposium participants upon their arrival in Caracas. Proceedings of the symposium, including the papers of invited speakers, selected contributed papers and summaries by the several convenors, will be published subsequently by UNESCO and FAO. Limited support for travel of participants from developing countries in the CICAR region will be made available through the IOC and UNESCO. Requests for such support should be submitted, together with the abstracts of the proposed paper, to: Dr. Harris B. Stewart, Jr., Chairman, CICAR-II Steering Committee, NOAA Atlantic Oceanographic and Meteorological Laboratories, 15 Rickenbacker Causeway, Virginia Key, Miami, Florida 33149, U.S.A.

Phytoplankton Course for Experienced Participants. Oslo, Norway. 26 July - 20 August 1976

This four-week course will take place at the Department of Marine Biology and Limnology, Section of Marine Botany, University of Oslo. Eligible for participation will be 12 candidates with a Ph.D., M.Sc. or B.Sc. degree or equivalent, and with experience from phytoplankton work (species identification, cell enumeration by microscopy). The programme will consist of: Culture, preparation and enumeration techniques (1 week). Training in identification (2 weeks). Specialized training in identification and enumeration (1 week). Course leader: Dr. Grethe Rytter Hasle. Teachers: K.R. Gaarder, G.R. Hasle, B.R. Heimdal, E. Paasche. K. Tangen, J. Throndsen.

General: Participants are expected to have a general knowledge of marine phytoplankton based on experience with the light microscope, and to have been working in the field of marine phytoplankton for at least two years. It should be noted that the course will be organized as a workshop rather than as a series of university classes.

Content of the programme: 1st week: Establishment of unialgal cultures for identification purposes; use of dilution technique for quantitative determinations and for identification purposes; management of cultures; preparation techniques. - 2nd & 3rd weeks: Identification of marine plankton algae from the plankton collection of the Department and from material brought to Oslo by the participants. - 4th week: Specialized studies in smaller groups, e.g. (1) the inverted microscope method; (2) detailed studies (including electron microscopy) of the morphology and taxonomy of coccolithophorids, other flagellates, diatoms. Seminars.

Training methods: The course will be conducted in the laboratories of the Department of Marine Biology and Limnology. Literature for identification as well as research light microscopes and culture facilities will be in use. Cell enumerations will be carried out on phytoplankton from the Oslofjord. In connection with the various topics covered in the laboratory, there will be lectures by specialist teachers. To a certain extent the participants are expected to give seminars dealing with their own research.

Since the diversity of the plankton flora of the world oceans is too great to be studied in every detail during the course, particular emphasis will be given to the use of identification literature. The participants are expected to take an active part by sharing their own knowledge with the rest of the group, by assisting in the correct identification of species, etc.

Finances: There will be no fee for registration or tuition but the participants will have to finance their own travel and their stay in Oslo. Accommodation in a student hostel with cooking facilities will be available. (The Norwegian Agency for International Development will make fellowships available for up to five participants. These fellowships are reserved for certain countries and will be advertised separately.)

Application and enquiries: Application giving full details of training, professional experience and present affiliation should be submitted by January 15, 1976. Applications and enquiries should be mailed to: Dr. Grethe R. Hasle. Dept. of Marine Biology and Limnology, Section of Marine Botany. University of Oslo, P.O.Box 1069 Blindern, Oslo 3, Norway.

Fourth Symposium on Recent and Fossil Marine Diatoms. Oslo, Norway, 30 August-3 September 1976

Symposium theme: Ecology, biostratigraphy, and taxonomy of marine diatoms. The programme will include:
1. Ecology of planktonic and benthic marine diatoms (experimental and field observations on modern diatoms, paleo-ecology)
2. Diatom morphology, life cycles, taxonomy
3. Temporal and spatial distribution of modern and fossil planktonic and benthic marine diatoms (including mathematical methods and modelling)
4. Sedimentation, diagnosis, dating.

The symposium will include presentation of papers, demonstrations, informal discussions of photographs, diagrams and microscopical preparations as well as working sessions on diatom terminology, a diatom catalogue, and the future work of the executive committee chosen by consensus at the last diatom symposium. The proceedings will be published.

The announcement of the symposium has been sent to 18 biological and micropaleontological journals and newsletters, and to 70 scientists.

Organizing committee: L.H. Burckle, USA, G.R. Hasle, Norway. V.V. Muhina, USSR, E. Paasche, Norway, R. Ross, UK, H.-J. Schrader, F.R.Germany, R. Simonsen, F.R.Germany. Local organizers: Dr. G.R. Hasle and Professor E. Paasche, Department of Marine Biology and Limnology, Section of Marine Botany, University of Oslo, P.O.Box 1069 Blindern, Oslo 3, Norway.

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

The Scientific Programme will consist of general symposia of invited papers on selected topics of broad interdisciplinary interest, special symposia of invited papers on selected specialized subjects involving more than one of the marine scientific disciplines and Association sessions organized by the specialized Associations, IAPSO, IABO, and CMG. Each symposium will occupy one half day.

General Symposia

History of the Oceans: Ocean basins, water circulation and sediments. Evolution of composition of ocean waters. Changing patterns of productivity and the origin of mineral resources.

Ocean Circulation and Marine Life: Ocean wide movements. Mesoscale movements. Productivity and its dependence on transport and mixing.

Natural variations in the Marine Environment: Space and time scales of physical processes. The influence of atmospheric processes. Variability of ecosystems.

Man and the sea: Non-renewable resources of the ocean. Resources and uses of coastal zone. Living resources of the ocean.

New approaches in oceanography: Conceptual and methodological approaches. New analytical approaches. Remote sensing. New instruments and techniques.

Summary Papers: Geology/Geophysics. Physical and chemical oceanography. Biological oceanography. Applied aspects.

Special Symposia (Biological Oceanography)

Regional Studies of Dynamics and Productivity: Reviews of physical and biological processes. Coastal and equatorial upwellmg. Mediterranean dynamics, productivity and biology. Peruvian upwelling domes.

Depths of the ocean: Deep-sea sedimentary processes. - Deep circulation on meso and larger scales. – Deep circulation on small scale. - Deep-sea bottom community components. – The biology of deep-sea benthic invertebrates.

Biological effects of ocean variability: Ocean variability and its biological effects. Scales of response – copepods to cod. Regional review - North Atlantic. Regional review - North Sea. Regional review - N.E. Pacific. Regional review - Peru and eastern equatorial Pacific.

Oceanography and Fisheries: Fishery oceanography - concepts and problem areas. Fluctuations in cod stock and climate in West Greenland. Peru anchovy stock and El Niño. Oceanography in tuna research. Effects on fish resources of man. Variations in reproduction.

Controlled ecosystem experiments: Upwelled impoundments. The sluice dock. Plastic water columns. Benthic growth chambers. Water towers. New designs.

IABO Sessions

Microbial processes of the sea floor: Quantitative aspects of the sulfur cycle in marine sediments. The impact of microbial sulfate-reduction on the release of nutrients from the sediment. Anaerobic microbial calcite formation: Great Barrier Reef studies. Anaerobic processes in sediments. Rates of microbial processes in the Deep Sea: psychrophilic and barophilic bacteria.

Dynamics of ecosystems: Predator-prey relationships. Lower parts of the pelagic food web and its relation to physical environment. Position of fish larvae in the ecosystem. Pelagic remineralization. Upper part of benthic food web. The structure of pelagic food chains in the sea.

Contributions in biological oceanography (two sessions).

Printed abstracts: Abstracts of invited papers being presented will be printed in advance and distributed to all Full Participants at the start of the Assembly. The work of compiling these abstracts will be undertaken by FAO and the convenors of the general and special symposia will instruct authors of invited papers on the procedure they should follow in preparing an abstract of their paper for this volume.

Publication of papers: The invited papers presented at the six general symposia will be published in full in a hardback volume, and it is expected that this will be available in early 1977. Details of the cost of this book will be available at the Assembly when orders may be placed at a special pre-publication price. The papers presented at the special symposia may be published by the Associations or other organisations concerned.

Registration: The Royal Society of Edinburgh, 22-24 George St., Edinburgh EH2 2PQ, U.K.

Third International Coral Reef Symposium. Western Atlantic Reefs, May, July, or October 1977.

Purpose: The Continuing Committee for International Coral Reef Symposia intends to arrange a Third Symposium to be held in the Western Atlantic during 1977. It will follow the format of the Second held in Australia in 1973: a cruise by chartered passenger liner will combine presentation of papers aboard ship with field excursions to a variety of typical Atlantic reefs.

Where: The shipboard Symposium will originate from San Juan, Puerto Rico, or Miami, Florida. During the week-long cruise, sessions and symposia will alternate with visits to representative reefs. The cruise will terminate either in Miami or San Juan.

When: Three possible dates in 1977 are being considered: 1) either of the last 2 weeks in May, or 2) one of the first 2 weeks in July, or 3) the last week in October.

Cost: Estimated cost of the week-long cruise is US dollars 375-750/person depending on shipboard accommodations.

Grants-In-Aid: The Organizing Committee will attempt to find partial support for participants who are unable to fund their own expenses.

Participation: Approximately 600 persons can be accommodated on the cruise: first preference will be given to scientists active in research on coral reefs and to students; families and observers will be included if space permits.

Presentation of Reports: A series of sessions on various topics is planned: A, Reef-building Biota. B, Geology and Geography of Reefs. C, Physical and Chemical Oceanography of Reef Areas. D, Man's Impact on Reefs. E, History of Reef Research.

Travel to and from the Symposium: Charter flights from London and from Honolulu (pick-up in Los Angeles) are under consideration.

Pre- and Post-Symposium Trips to Other Reef Areas: The Committee will not organize additional trips to other reef areas in the 'Western Atllantic. However, if there is sufficient interest in these trips, the Committee will seek to stimulate specialists to organize *ad-hoc* excursions.

Interim Organizing Committee: Ian Macintyre, Eugene A. Shinn, Harris B. Stewart,David R. Stoddart, as well as Robert N.Ginsburg and Dennis L. Taylor, Rosenstiel School of Marine and Atmospheric Science, 4600 Rickenbacker Causeway, Miami, Florida 33149, U.S.A. Copies of the first circular can be obtained at this address.

Third International Meiofauna Conference. Hamburg, F.R.Germany. 23 - 27 August 1977.

Sponsoring Institutions: University of Hamburg: Zoologisches Institut und Zoologisches Museum and Institut für Hydrobiologie und Fischereiwissenschaft.

Time and Place: 23-27 August 1977 at Universität Hamburg, Zoologisches Institut und Museum, 2 Hamburg 13 Martin-Luther-King-Platz 3.

Costs: Symposium fee: US dollars 15.

Papers: You are invited to present papers at this symposium. For each paper we will allow 20 minutes for the presentation and an additional 5 minutes for the discussion. No special topics are selected; papers will be arranged in groups by the symposium committee. Purely taxonomic contributions will not be accepted. It is not intended to publish the papers in a symposium volume in order to encourage the presentation of preliminary results. However, speakers may indicate their interest in publication, and we will try to have those papers published as a unit.

Languages: Papers and discussion remarks should be presented in English. No translation service will be available.

Abstracts: All speakers are asked to deliver an abstract of their paper in English not later than 1 February 1977. The abstract should present hard data, not only general statements. If too many papers are offered, the committee will choose which papers are to be presented according to the information contained in their abstracts.

Excursion: Bus and walking tour to Lüneburger Heide: Heather Nature Reserve. This will be arranged" during the symposium days, if enough interest is shown.

Workshop: A special workshop is planned under the topic "International calibration of methods used in meiofauna research".

Films and Slides: Participants are invited to present films and slides on meiofauna and on meiobenthologists in an evening program.

Time schedule: 1 September 1976: Deadline for first application. October 1976: Second announcement, tentative program. 1 February 1977: Final application, hotel reservation, deadline for abstracts.

Application Forms can be obtained at Timco Symposium Office, Institut für Hydrobiologie und Fischereiwissenschaft, 2 Hamburg 50, Palmaille 55, F.R.Germany.

7. REPORTS BY NATIONAL CORRESPONDENTS

ARGENTINA

Staff. At the present time about 80 specialists and 40 technicians (among them many students) are working on different problems related to biological oceanography in Argentina. Many of them, however, belong also to a teaching staff and thus only part of their time can be dedicated to research activity. All the researchers can be roughly divided into six groups. It should be taken into account that several scientists have been included in two or even more groups. The approximate number of specialists involved is indicated in parenthesis after the name of each field of activity. Bacteriology (5), Phycology (10), Phyto- and Zooplankton (25), Benthos (20), Ichthyology and Fisheries (40), Miscellaneous (10).

Institutions. There are 12 institutions where marine biological studies are carried out to some extent. However, their activities and productions are quite different. Below are enumerated (arranged alphabetically) only those which are more important as far as marine biological activity is concerned: CIBIMA ("Centro de Investigación de Biología Marina"), IAA ("Instituto Antárctico Argentino"), IBM ("Instituto de Biología Marina"), MACN ("Museo Argentino de Ciencias Naturales"). Although the main objective of MLP ("Museo de La Plata") and UBA ("Universidad de Buenos Aires") is teaching, their staff are also involved in several kinds of marine biological studies. In addition, the SUN ("Servicio de Hidrografía Naval") should be mentioned. Its main task is to prepare nautical maps and to make physical, chemical, and geophysical studies. Biological studies are carried out on a small scale. However, since the beginning of Argentine oceanographic research the only institution having vessels to collect material in the open sea has been the SHN.

Stations. There are six Argentine marine biological stations on the continent and eleven stations in the Argentine sector of the Antarctic, although only few Antarctic stations have facilities for biological work and can carry out biological programs. The most important continental stations are: "Estación de Biología Marina Austral" (Ushuaia, Tierra del Fuego), "Estación Hidrobiológica de Quequén" (Quequén, Prov. de Buenos Aires), and "Estación Puerto Deseado" (Puerto Deseado,Prov.de Santa Cruz). The most important Antarctic station is "Estación Científica Almirante Brown". All these stations have equipment for collecting and microscopic work, as well as living quarters.

Ships. There are in Argentina the following ships which can collect material and data for marine biological" "studies: Two old ships, GOYENA (1863 t) and THOMPSON (appr. 1200 t) converted for general oceanographic work. One sailing ship, EL AUSTRAL (ex-ATLANTIS II, 296 t) with a motor. Two ships. CRUZ DEL SUR and EOLO (both appr. 300 t) designed mainly for fisheries research. Two hydrographic cutters, CORMORAN and PETREL, which can work only in the nearshore zone. Argentine scientists participate frequently in cruises of foreign oceanographic vessels in the southwestern Atlantic or the Southern Ocean.

According to the agreement signed by the U.S. National Science Foundation and the Argentine Navy through the SHN and IAA, the R/V ISLAS ORCADAS (ex-ELTANIN) will work five years in the Sub-antarctic waters of the South Atlantic (chiefly western part) and in the Antarctic. This vessel started her cruises in 1975. Her crew will be Argentine, the scientific staff Argentine and North American.

A new oceanographic ship (appr. 2000 t) with 10 laboratories and accommodation for more than 20 scientists is now being built in an Argentine dockyard. Unfortunately for several reasons the termination of her construction and equipment is postponed until approximately 1978.

Studies. Marine biological studies are diverse, and only the most important are cited below. The main Institutions involved in these studies are indicated in parenthesis: Taxonomy, Biology and Distribution of Marine Invertebrates (CIBIMA, IAA, IBM, MACN, MLP, UBA); Hydrological indicators (IBM, MACN, UBA); Ichthyology and Fisheries (IBM, IAA, MACN); Phycology (CIBIMA, MACN); Productivity (CIBIMA, IBM, MACN); Bacteriology (MACN); Marine fouling (IBM); Fish parasitology (IBM, MACN); Trophic chains (IBM).

Education in Oceanography. Thanks to the joint efforts of the Argentine Navy, the CONICET ("Consejo Nacional de Investigaciones Científicas y Técnicas") and the UNS ("Universidad Nacional del Sur") the university career in oceanography was established at the IADO (" Instituto Argentino de Oceanografía", Bahía Blanca) and will be started in 1976. Those having finished this career (5 years) will get the degree of "Licenciado" (corresponding to M.Sc.) in physical, biological, geological, or chemical oceanography.

Publications. The average annual production of scientific papers by Argentine marine biologists is about 40.

Miscellaneous. CEADO ("Centro Argentino de Datos Oceanográficos") was established in the SHN by joint efforts of {he Navy and CONICET. It covers the southwestern Atlantic Ocean; biological data are included too.

CADIC ("Centro Austral de Investigaciones Cientificas") is now in construction by CONICET near Ushuaia (Tierra del Fuego). It will consist of many laboratories and several houses to accommodate visiting scientists and permanently working scientists. The main objective of CADIC will be a study of southern part of the continental Argentina, the

Antarctic, and Subantarctic and Antarctic islands. Eighteen laboratories will be reserved for marine biology. We hope that in 3-5 years the CADIC will start its activity.

An Argentine Oceanographic Symposium took place in Buenos Aires in 1975. Some papers on biological oceanography were presented and discussed.

It is planned to organize in Argentina in 1977 the Second International Oceanographic Symposium for the South-western Atlantic. The First Symposium took place in Rio de Janeiro in 1964. I shall be pleased to supply more detailed information on request.

E. Boltovskoy

AUSTRALIA

The momentum of biological oceanography in Australia is heavily dependent on the availability of resources, particularly marine laboratories by the sea and "oceanographic" research vessels. Australia has yet to commission its first oceanographic research vessel, although one for CSIRO is currently at the design stage. By contrast, several marine laboratories are currently under construction, one at Perth, one at Cleveland (Brisbane), and one at Turtle Bay (Townsville). There are plans for another at Portsea (Victoria).

As a consequence, most of the biological oceanography in Australia in the 1970's has been shore-oriented, the open ocean phase of Australia's involvement having largely come to an end (except for fisheries oriented biological oceanography) with the laying up of the naval oceanographic vessels GASCOYNE and DIAMANTINA.

The state of marine science in Australia is currently under review by the Australian Science and Technology Council and there could therefore be substantial changes in the future. Major Australian developments and research projects in the broad field of biological oceanography (i.e. both near-shore and open-space) are as follows:

(1) An Australian Institute of Marine Science (AIMS) has been established at Townsville (North Queensland). The research of the Institute includes studies of the Great Barrier Reef, the Coral Sea area and the North Queensland coast north and south of Townsville. The Institute is currently housed in temporary premises (Cape Pallarenda), but will shortly occupy a permanent site at Turtle Bay (south of Townsville) where a laboratory complex, aquaria, and berthing facilities for the Institute's vessels are being built. The Director is Dr. M. Gilmartin. Senior staff include Dr. J. S. Bunt (Inshore productivity) Dr. W. Hamner (Zooplankton), Dr. R. Olafson (Pollution), and Drs C. Crossland and D. Barnes (Calcification). Current programmes include a mangrove study at Hinchinbrook Is., and coral reef studies in collaboration with other Australian laboratories at Lizard Island (The LIMER Expeditions).

(2) CSIRO Northeastern Regional Laboratory (Cleveland, Brisbane). A new biological laboratory for CSIRO (Division of Fisheries and Oceanography) is nearing completion. The group at Cleveland (Head: Dr. W. Dall) are concerned primarily with crustacean biology and, in particular, with the various aspects of tropical prawns in North Australian waters.

Monthly cruises are taking place across the Gulf of Carpentaria to study the distribution and abundance of the larval stages of species harvested by the Gulf prawn fishery. These studies are directed towards an understanding of the physical and biological mechanisms by which oceanic larvae move to their estuarine nursery grounds and later stages return from the rivers to the sea. Other study areas include Moreton Bay on which the laboratory is located, and Princess Charlotte Bay (North Queensland). Complementary studies by the group include research on prawn feeding habits and the ecological genetics of prawn populations.

(3) CSIRO Western Regional Laboratory (Perth). Studies are in progress at Perth (W.A.) on the biology of the western rock lobster and the oceanography of dispersal of the phyllosoma larvae. A series of intensive sampling cruises by charter vessel SPRIGHTLY is in progress, the current emphasis being on the return to the coast of the later (puerulus) stages. Concurrent physical studies on surface currents in the southwest Australian area are being made by drifting buoys in satellite communication (powered by solar cells) with the laboratory.

The group headed by Dr. R.G. Chittleborough will shortly be located in a new laboratory, currently under construction in the Perth suburb of Marmion.

(4) Survey of Pelagic Fish Resources in the Southwest Tasman Sea. Under the direction of Dr. G. Murphy, the CSIOR (Division of Fisheries and Oceanography) is making survey cruises by charter vessel COURAGEOUS. The vessel (a converted prawn trawler) is fitted with midwater trawls, and small otter trawls, but the main thrust of the research is on fish detection by computerized acoustics. The oceanographic component of the programme is small at the moment, but will gradually increase.

(5) Ecosystem Study of Port Hacking Estuary. An ecosystem group (Head: D.J. Tranter) is currently engaged in a system study of the ecology of a water body (South West Arm) within Port Hacking (a "flooded valley"), on the shores of which the Central (Cronulla) Laboratory of CSIRO's Division of Fisheries and Oceanography is located. The programme includes physical, chemical, and biological studies, and both water column and benthos. Energy flow through the system is being accounted for by means of a carbon model.

(6) Port Phillip Bay and Westernport Bay Projects (Melbourne). The Marine Pollution Group of the Victoria State Fisheries and Wildlife Department (Director: Dr. A. Gilmour) is engaged in collaborative studies of inshore water bodies. The emphasis to date has been on Port Phillip Bay, a large (750 square mile) shallow (mean depth 14 m) water body around the shores of which is located the metropolis of Melbourne. Current emphasis is on Westernport Bay, a smaller, shallower, less urbanised water body further east. Scientists from other institutes are working with these projects, e. g. , the University of Melbourne (Dr. B. Grant) is involved in studies on the primary production of Hobsons Bay near the mouth of the Yarra River.

In addition to these larger projects, marine biological studies are also being carried out by scientists at James Cook University (Townsville); the University of Queensland which manages the Heron Island Research Station (Director: Dr. A. Bruce); the University of Sydney which manages the One Tree Island Research Station (Coordinator: Dr. P. Sale); and various State Departments of Fisheries and Environment.

D.J. Tranter

BRAZIL

In the last few years the National Oceanographic Commission has been created under the National Scientific and Technological Development Council. This Federal Commission is responsible for advising the Federal Brazilian Government on the national oceanographical policy.

At the latest meeting of the National Oceanographic Commission, held in May 1975, an Oceanographical Integrated Programme was proposed in which the Biological Oceanography Programme is included. It may be summarized as follows:
A minimum Marine Biology Plan was established, involving marine life knowledgement mainly referring to the continental shelf and estuarine zones.
The purpose of this Programme is to attain basic data on the marine life, particularly on those revealing inter- and intraspecific relationships and the environment influences on the spatial and temporal distribution and abundance of the dominant species. This knowledge can be used as an important tool to support aquaculture, fishing, and pollution control. Good advance has been made in the training programme in order to graduate people to collaborate in the planned works.

(a) Taxonomy: Inventory on algae, crustaceans, molluscs, and fishes from the north-eastern and southern Brazilian coast.

(b) Biochemistry and Histology: Studies on blood and haemolymph of fish and crustaceans in order to recognize geographical groups. Histology of reproductive organs of fish and crustaceans.

(c) Life History and Bionomics: Referring mainly to the pelagic and demersal fishes and shrimps along the coast and some estuarine areas. Spawning and larval history, feeding habits, reproduction and growth of adults.

(d) Distribution: Shrimps and demersal fishes and the benthic fauna are intensively studied in order to give a general pattern of geographical distribution and of the effects that ecological determinants have on distribution and on respective abundance.

(e) Exploitation: The Federal Fishing Agency is providing a survey of the fisheries characteristics in order to evaluate the real fishing operations and their results with a view to the protection and management of marine resources.

G. Vazzoler

CHILE

The Department of Oceanology of the University of Chile is engaged in the following investigations: Distribution and food habits of marine birds; Autecology and natural history of the hard clam, *Prothothaca thaca*; The effect of environmental factors on fish eggs and larvae, especially sardines and hake; Vertical distribution and the adaptive value of diel migration on euphausians of the Chile-Peru Current; Larval development and rearing of euphausians in the laboratory; Taxonomy of the algae in the Magellanic zone; Seasonal variations of phytoplankton productivity in Valparaiso Bay; Taxonomy of planktonic bivalve larvae in Valparaiso Bay; Population dynamics studies on rock shrimps (*Rhynchocynetes tipus*). This institution has just published Nos 2 and 3 of Vol. 15 of the Revista de Biologia Marina.

The University of Chile also possesses a marine biology laboratory in Antofagasta, which is concerned with the ecological study of the Mejillones Bay and the distribution of the flora and fauna of the intertidal zone in the northern area of our country. Another marine laboratory is being planned for the southern zone (Puerto Montt).

The University of Concepción is working in a program of Physical and Chemical Oceanography in the Bay of Concepci6n, where Mytilidae cultures are being conducted.

The National Oceanographic Committee (CONA) is coordinating the participation of Chilean Institutions together with those of Equador, Peru, and Colombia in the ERFEN Project (Studies of "El Niño" Oceanographic Phenomenon) which includes both oceanographical and biological investigations.

Two important meetings have taken place during 1975: a seminar on the conservation of the marine environment, in Santiago, and the 5th meeting of COCIC, of the South Pacific Permanent Commission, in Viña del Mar, where scientists from Chile, Peru, Ecuador, and international agencies such as FAO and COI gathered.

L. Ramorino

DENMARK

University of Aarhus: The Department of Ecology and Genetics is mainly concerned with the ecology of shallow water sediments. Research programmes are decomposition of dead organic matter, utilization of detritus by animals, the sulphur and nitrogen cycle and ecology of anaerobic sediments, polymorphic systems and isoenzymes of marine gastropods and fish. The Department operates a field station at Rønbjerg, Limfjorden, with emphasis on inter- and intraspecific competition and population dynamics of marine gastropods and crustaceans. - The Department of Zoology has a project on the fine structure and function of hearing organs in flatfish. - The Department of Zoophysiology is mainly focussed on respiration physiology including marine fish and a project is run on sensory physiology of whales and seals.

University of Copenhagen: The Marine Biological Laboratory, Helsing0r focusses at present on investigations on quantitative aspects of the meiofauna, predator-prey relationships (particularly turbellarian, nematodes, Natica and Asterias), biological-ecological studies (parasitic turbellarians, polychaetes, Thyasira, Bathyporeia, and crab larvae), physiology of Crangon, comparative morphology of larvae of Entoand Ectoprocta, and the influence of pollution on the algae of the 0resund. - From the Isefjord Laboratory, Vellerup Vig, are carried out ecological field studies of the benthic invertebrate fauna of the complex, mixo-haline Isefjord area, supplemented with an investigation of the eelgrass and its communities. - The Zoological Museum is concerned with the taxonomy, distribution and ecology of Greenland marine animals. North Atlantic opisthobranchs and Octopoda, and deep-sea organisms (particularly bathy-pelagic and brotulid fish, echinoderms, prosobranchs, bivalves, isopods, polychaetes, and foraminiferans). - The Zoophysiological Laboratory A, August Krogh Institute undertakes a long-term investigation of food and other particle retention in suspension-feeders, studied with the Coulter counter technique and special studies of osmotic regulation and ion transport (nereid polychaetes) and uptake of organic molecules front the environment (nereid polychaetes and bivalves). - The Institute of Thallophytic Botany is engaged in studies on the taxonomy and ecology of marine and brackish water algae from Denmark and Greenland, life cycle studies, especially on green and brown algae, and research on plankton from Danish waters, mainly EM-studies on nanoplankton, and on comparative spermatology of the fucoid algae from Australia and New Zealand.

The Danish Institute for Fishery and Marine Research: The present activities are being concentrated on problems related to the exploitation of marine resources of fish and shellfish. A major part of this research programme comprises assessments of fish stocks and is coordinated through ICES. A special team work on ecosystem models relevant to both resource and pollution studies. Also economic models related to fish stock exploitation are being studied. A laboratory for studies of marine pollution is being established. It is expected to be in use by 1 April 1977. It will be dealing with monitoring of the open sea and experimental work on the effect of pollutants on marine organisms. The hydrographical department takes part in a joint Danish-Swedish project on exchange of water, salt and nutrients between the Baltic and the North Sea. Further, there are several projects on studies of the biology of commercially important fish species, and a physiological project on maturation of European eels. The institute employs 25 scientists. Its working area is the North Sea, Skagerrak, Kattegat, the Belt Seas. the Baltic, and the Faroes water.

The Greenland Fisheries Investigations: The present activities comprise hydrography of Greenland waters, studies of the recruitment and exploitation of commercially important fish (particularly cod), growth and migrations of salmon, and investigations on seals and the deep-sea prawn, Pandalus borealis. An essential part of the research (especially cod, salmon and seals) is made in international co-operation organized by ICNAF and ICES. Since 1973 research on marine pollution has been undertaken in relation to technical activities (mining and oil research).

T. Wolff

GERMANY, F. R. G.

In the brief outline given below on the principal activities in biological oceanography in the F.R.G., only the main objects of research work are mentioned. Some of the research projects (upwelling. North Sea, Baltic) are performed in co-operation with scientists from several institutions (non biological ones not listed). Certain investigations, particularly experimental laboratory studies and taxonomic investigations on marine organisms, have not been included in this report.

Biologische Anstalt Helgoland ; Investigations on primary production and plankton in the North Sea and in the eastern North Atlantic. Ecological experiments, in situ and in the laboratory, are carried out on the behaviour, competition, and species composition in benthic and pelagic organisms.

Institut für Meeresforschung, Bremerhayen. Investigations on the transfer of organic material within the benthic community of the North Sea and the eastern North Atlantic, covering bacteriological and mycological studies as well as investigations on the meio- and macrofauna. Experimental work has been initiated on the physiological efficiency of some marine organisms and their relevance to the food chain. Pollution research includes the effect of turbidity, lead and bismuth on marine organisms, production of macrofauna under the influence of waste products, and the distribution and fate of organic pollutants in the marine environment, with special reference to organohalogen compounds and their effects on metabolism.

Institut für Meereskunde, Universität Kiel: Planktological studies are focussing on short-time variations in phyto- and zooplankton distribution and on the transfer of organic matter in the food web. Primary productivity and zooplankton biomass, particularly in relation to chemical parameters, are investigated in areas of upwelling off western North Africa, and in the Baltic. Experiments with plastic bags, with connections to the bottom, are run to study production, transfer, degradation, and sedimentation of organic matter in an enclosed water volume. Fishery investigations include food studies of pelagic and demersal fish, an evaluation of the benthos as fish food in the Baltic, fish larvae and neuston studies in different regions of the North Atlantic Ocean. Production of algae is investigated through *in-situ* experiments. Pollution research in the Baltic is done in close co-operation between departments.

Institut für Hydrobiologie und Fischereiwissenschaft, Universität Hamburg: Investigations on zooplankton (epipelagic zone) and benthos (meio-, macro-, megafauna, sediment characteristics) concentrate on the upwelling region off West Africa and on the North Sea (Fladenground Experiment). Primary production in the North Sea is studied through aerial mapping of chlorophyll and temperature.

Institut für Meeresgeologie und Meeresbiologie Senckenberg, Wilhelmshaven. Investigations are carried out on sedimentological processes in recent marine environments and the relationship between the benthic fauna and sediments to obtain a geological-paleontological picture of the different sub-environments.

Bundesforschungsanstalt für Fischerei, Hamburg. Investigations on all problems of applied fisheries (coastal areas. North Sea, North Atlantic Ocean and adjacent seas. South Atlantic Ocean).

Hj. Thiel

ICELAND

The Marine Research Institute, Reykjavik: This is a governmental institute and its 20 scientists are mainly engaged in research on fish and shellfish and related environmental problems in the sea. The working areas are the waters all around Iceland and adjacent seas as e.g. East Greenland, the Greenland Sea, and the northern North Sea. The main emphasis is laid on applied fisheries research such as assessments and other studies on the population of commercially important species. But there is also a great deal of general research in marine biology. There have not been any major changes in the general line of work since the last National Report (IABO Proc. 1, 1971). There has, however, been a considerable expansion as to staff, facilities, and research objectives taken into the regular research programme (e.g. research on Macruridae, Argentina, marine geology, certain aspects of pollution). The institute is now operating four research vessels. A branch of the institute has been put up on the north coast (Husavik) with the main task of collecting and tabulating data.

The Surtsey Research Society has maintained the studies on the bottom fauna and flora around Surtsey.

The University of Iceland has lately become engaged in the study of the littoral fauna and flora, both ecological and physiological.

J. Magnusson

INDIA

The present report is a supplementary to that published in IABO Proceedings l &2.

Biological Oceanography work continues to be carried out in the Central Marine Fisheries Research Institute at Cochin and its substations, in the National Institute of Oceanography at Goa and its stations at Cochin and Bombay, and in the Marine Biology/Biology/Marine Sciences 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 Integrated Fisheries Project (previously known as Indo-Norwegian Project), the UNDP Pelagic Fisheries Project, and the Off-shore 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 major problems under investigation during the last three years were the investigation of the primary productivity in the inshore and offshore waters around the Indian Peninsula and in the estuarine systems, studies on the mud banks of the Kerala coast, the quantitative distribution of the zooplankton on the continental shelf, taxonomy and ecology of the coral reefs and sponges of the Indian seas, studies on the major sea fishery resources, ecology of mangrove swamps, productivity of sandy beaches, experimental studies on secondary production, environmental physiology in relation to fish culture, coastal aquaculture, and pollution in the estuaries and inshore waters.

The Cochin, Annamalai, and Karnatak Universities are having two years post graduate courses in Marine Biology and most of the maritime universities admit students for doctorate program in Biological Oceanography.

The studies on the primary production conducted by CMFRI have shown that within 50 m in the inshore waters of the west coast of India the mean value is 1.24 gC/m^2/day. On the east coast the production is slightly less. In the estuarine system of Cochin the annual gross production was found to vary from 150 to 650 gC/m^2. Ten species of unialgal cultures have been developed for rearing experiments. Harpacticoid copepods have been reared through different development stages. Larvae of commercially important prawns have been successfully reared at the Cochin, Bombay, and Retnagiri Laboratories from the egg to the adult stages. Experiments on the mass culture of seaweeds, pearl oyster and mussel have shown promising results and cultured pearls have been produced at Tuticorin and Vizhingom. Prawn culture in the estuarine ponds has given a yield of 500 to 2000 kg/ha. With a view to popularizing prawn culture and intensifying research in raising seed for fast growing species a Prawn Culture Laboratory has been opened by CMFRI at Narakkal (Cochin) in September 1975.

Induced spawning of the grey mullet Mugil macrolepis and the large scale rearing of its larvae have been successfully carried out at the Azhikode research centre of the Kerala State Fisheries Department.

The research vessels VARUNA (Integrated Fisheries Project) and RASTRELLIGER (UNDP Pelagic Fisheries Project) conducted extensive fishery resources surveys in the inshore and offshore waters along the west coast of India. Data regarding the distribution of fish eggs and larval stages of commercially important pelagic and benthic fishes have been obtained. The INS DARSHAK has been available for some of the investigations on plankton and benthos conducted by N10 in the northeastern Arabian shelf. Research vessels SAGITTA (Cochin University), NEENDAKARA, NAUPLIUS, and TARIN1 (N10) and CADALMIN (CMFRI) conducted routine cruises in the estuaries and inshore waters. A 220ft. vessel GAVESHANI for N10 and a 43.5 ft. vessel for the Department of Marine Sciences are under construction and will be ready by January 1976.

The results of the investigations carried out in the various laboratories are published in Indian and foreign journals.

C.V. Kurian

ISRAEL

As in the past. the main activities in the field of Marine Biology and Biological Oceanography are carried out in the appropriate departments of the Hebrew University of Jerusalem, the University of Tel-Aviv, and the Israel Oceanographic & Limnological Research Ltd. at Tel-Shikmona Haifa.

Work is still proceeding on the processing of the large-scale collections of marine organisms carried out during the five-year research project sponsored by the Smithsonian Institution on the "Biota of the Eastern Mediterranean and the Red Sea".

Among the specific research projects currently being carried out, the following may be mentioned:

(a) A study of the early larval stages of *Mugil* from the standpoints of their behaviour in the natural environment, with special emphasis on their food and feeding habits.

(b) Developmental aspects of shrimp culture (Penaeidae) in the marine environment and in

the laboratory.

(c) Taxonomy and zoogeography of decapod crustaceans.

(d) A study of the macrobenthic fauna in Haifa Bay.

(e) Development and dynamics of benthic communities on artificial substrates off the Mediterranean and Red Sea coasts of Israel.

(f) A quantitative study of Foraminifera, Pteropoda and calcareous nannoplankton recorded from the plankton, recent sediments and submarine cores in the eastern Mediterranean and the Gulf of Eilat.

(g) A data-collecting programme in the Gulf of Eilat, to provide plankton samples and related physical and chemical data on a round-the-year basis.

(h) Species identification of Mugilidae.

Methods are being developed for the biochemical and immunological identification of grey mullets (Mugilidae), the emphasis being placed on the recognition of the species of small fry. For this purpose, a key has been worked out based on the disc-electrophoretic pattern of the water-soluble muscle proteins. Work is continuing on the use of antibodies against these proteins for the identification of the different species.

In the field of marine farming, the main stress is being put on the rearing of the gilt-head bream (*Sparus auratus*).

A study was carried out at the marine farming unit of the IOLR within the compound of the Steinitz Marine Biological Laboratory at Eilat on the suitability of Sparus auratus for marine farming. Young fishes were fed on artificial food pellets of various compositions. The growth rate of the fish proved to be very high (three times higher than in nature).

Another experiment was designed to breed these fishes artificially in the laboratory. This experiment proved successful, and today some 250 fishes obtained through artificial spawning thrive in the container facilities of the local hatchery. This breakthrough in induced spawning opens the way for more practical aspects of marine farming. Future investigations in this field will aim at increasing the survival rate of the early larval stages of the fish and improving their genetic characteristics.

Work is also continuing on rearing of the black-lipped pearl oyster, *Pinctada margaretifera*, in the Gulf of Eilat (Aqaba). In the last two and a half years, surveys have been undertaken to assess the density of this species in various ecological habitats, spat recruitment, growth rate, and the age structure distribution within the natural populations. Experiments were carried out to induce the growth of half-pearls in the oysters, and preliminary results are encouraging.

A laboratory dealing with the artificial rearing of marine plankton organisms, used as food for early larval fishes in marine farming experiments, is currently being established in the Institute of Oceanography at Tel-Shikmona, Haifa. The laboratory will concentrate on selected rearing under controlled conditions of phytoplankton and zooplankton organisms used in the feeding of larval fish species of commercial interest.

The First International Symposium on the Grey Mullet took place in Haifa in 1974. A report is given on p. 11 of this volume.

The marine pollution research includes, among other aspects, the monitoring of the marine environment's response to an industrial sewage outfall. This study, aimed at examining selected groups of organisms from the marine biota (plankton and periphyton) in the course of a "before and after" survey, is being continued for another year. This will supplement the data available on the pelagic ecosystem prior to the installation and operation of the outfall. Another study in the same field is concerned with the effects of different levels and types of pollutants on the genetic structure of five species of sessile marine organisms.

B. Kimor

ITALY

Institute of Zoology, University of Parma: Systematics and ecology of *Acantharia* from the Mediterranean Sea and the Atlantic Ocean. Radioecology of marine organisms and sediments with particular attention to Sr90, Cel37, and rare earths. Induced sexual maturity in fishes from the Venetian lagoon by hypophysis hormones.

Laboratory of Fisheries Technology of the C.N.R., Ancona: Evaluation of pelagic fisheries in northern and central Adriatic by echo-surveys and population dynamics research. Trophic ratios among some fishes of commercial value. Creation of a re-stocking area by artificial reefs.

Laboratory of Marine Biology, Bari: Seasonal studies on zooplankton with particular reference to Cladocera. Planktonic and benthic communities of polluted areas, mainly harbours of the Apulian coast.

Thalassographic Institute of Taranto: Biological and ecological studies of coastal waters of the industrial area. Growth studies on mussels of different cultivated grounds.

Institute of Animal Biology, University of Catania. Systematics of marine Isopoda, as well as systematics and biology of Polychaeta from the Mediterranean Sea and the Indian Ocean. Studies of communities on Posidonia beds.

University of Messina. Institute of Hydrobiology. Researches on marine and brackish water yeasts and on bacteria, the latter mainly dealing with the nitrogen cycle. Seasonal studies on nutrients, phytoplankton and zooplankton in the Messina Strait and adjacent areas concern also biomass and water masses indicators. Studies on pollution effects on Copepoda (Acartia) are progressing on world wide basis. - Institute of Zoology and Comparative Anatomy. Ecological surveys in coastal waters and off northeastern Sicily devoted to the study of the plankton distribution as well as of pollutants, heavy metals included. Large scale investigations have been planned in the same area for 1976.

Thalassographic Institute of Messina. Biology, ecology and fishing of the sword fish. Phyto-benthic communities of the Marsala Lagoon.

Sicilian Agency for Industrial Promotion. Research Fishery Section, Messina. Gamic schooling and migration of tuna in the Jonian and Tyrrhenian Seas. Hydrobiological research in the Marsala Lagoon to evaluate its use for intensive aquaculture.

Zoological Station. Naples. The current ecological programme concerns hydrography, primary and secondary productivity as well as the bionomics of the benthic communities of the Gulf.

Institute of Zoology. University of Rome. Systematics and experimental researches on the fouling and wood-boring organisms by using panels immersed at various depths and in different stations.

Laboratory for the study of radioactive contamination of the sea, C.N.E.N., Fiascherino. Studies on the *in-situ* distribution of the most important species at different trophic levels. Interrelationships and transfer of radionuclides among the various trophic links of marine food chains. Rearing, cultivation and maintenance of important species under laboratory conditions.

University of Genoa. Oceanological Research Group, Biological Section. Plankton, nutrients and environmental conditions of several coastal areas (harbours) of the Ligurian and North Tyrrhenian Seas; heavy metals content and metabolic stress of mussels from the same area to evaluate pollution. Bionomics of the benthic communities of the continental shelf of the western Riviera. – Institute of Zoology. Studies on littoral benthic communities with special reference to the coralligenous bottom, submarine caves, and their relations to pollution. Researches on parasitic copepods and Mediterranean plankton.

Civic Museum of Natural History, Genoa. Biogeography of littoral fishes from the Red Sea and the western Indian Ocean.Morphology and systematics of Chaetodontidae. Studies on variability of asteroids and revision of the Mediterranean seastars.

N. Delia Croce

JAPAN

Research work on biological oceanography has been done by vessels of universities and fisheries research laboratories. Hakuho Maru of the Ocean Research Institute, University of Tokyo, carried out 9 cruises since 1971. *Trichodesmium* ecosystem and benthic community were studied in the Kuroshio area and the East China Sea in 1971 and 1972, and in the sea of Southeast Asia in 1972. In 1971, 1973, and 1974 biological production and processes were studied in the subarctic sea area of the Pacific including the Bering Sea and the result was compared with that obtained in the subtropical area. Larvae of Anguilla japonica and its spawning ground were investigated twice in 1973 and once in 1975.

In Japanese coastal waters such as Tokyo Bay, Ise Bay, Seto Inland Sea, Ariake Sea, etc., the mechanism of outburst of red tide and the physiology and ecology of red tide organisms and the influence of red tide on aquaculture and fishery have been studied in connection with eutrophication and various types of marine pollution.

Since 1971, many symposia on biological oceanography have been held, namely 4 by the Plankton Society of Japan, 13 by the Japanese Society of Fisheries Oceanography, and 19 by the Ocean Research Institute. The titles of some of these

symposia were as follows: Phytoplankton Pigments; Biology, Chemistry and Physics on Surface Skin Layer; Problems on Recent Red Tide Study; Rearing and Mass Culture of Zooplankton; Pollution and Its Effects on Marine Fisheries; Problems on Biological Sequence from Primary Production to Fish Production; Common Squid in the Japan Sea; Exploitation of New Fishing Grounds and Fisheries Oceanography; North Pacific Fisheries in the Recent International Circumstances; Abnormal Cold Water Mass off Sanriku and Joban Districts in 1974; Physiology on Fish Migration; Coral Reef Ecosystem; Marine Fouling Organisms; Phytoplankton Community in the Tropical Areas; Chaetognaths; Problems on Pirmipedia; Ecology and Environments of Early Stages of Marine Living Resources; Ecology on Asteroidea and Ophiuroidea; Taxonomy on Marine Plankton; Recent Knowledge on Eels.

An IDOE project on biological oceanography, MESTA (Marine Ecosystem Study in Tropical Areas) is being planned. It has four subprojects: Study on Oceanic Ecosystem in the Tropical Areas; Study on Production Structure of Marine Living Resources in Tropical Areas; Study on Ecosystem in Coral Reef Areas; Sea-grass Ecosystem Component Study.

R. Marumo

NEW ZEALAND

Marine biological research in New Zealand is concentrated in the Universities and Government departments. The four universities have their own marine stations - Auckland University at Leigh, Victoria University of Wellington at Island Bay, Canterbury University at the Edward Percival Marine Laboratory at Kaikoura, and Otago University at Portobello. The work carried out at these stations includes not only biological work but also physical, physiological, and geological research.

Fisheries Research in both marine and freshwater fields is carried out by the Fisheries Research and Management Divisions of the Ministry of Agriculture and Fisheries in Wellington who run three research vessels, the JAMES COOK, a 42 m stern trawler of 552 gross tons, the W.J.SCOTT, a 28.4 m "gear technology" vessel, and the IKATERE, a small 19.2 m stern trawler.

Both Victoria and Otago Universities have research vessels. TIROHIA is a 13.3 m vessel built for the Zoology Department of Victoria in 1966. Portobello Marine Biological Station has MUNIDA, a 15 m vessel built in 1965.

The New Zealand Oceanographic Institute, in Wellington, which includes geologists and physical oceanographers on its staff as well as biologists, has a 75 m vessel, R.V. TANGAROA, of 1360 gross tons. Most of the Institute's biological work so far has concentrated on benthic ecology in offshore waters, not only around New Zealand, but also in the Antarctic and in the Pacific Islands, especially in the Cook Islands Group. Work on plankton has received less emphasis but - as at Portobello, the Universities, and Fisheries Research Division - there has been a restricted but nevertheless continuing interest which is likely to receive increasing attention. More recently, increasing demands for biological research for environmental purposes have resulted in growing attention to coastal research and estuarine and sheltered water studies.

The Research Division of the Ministry of Agriculture and Fisheries has concentrated on the biology and population structure of economically important fish, and crustacean and molluscan species of commercial importance - deepwater oysters, mussels, scallops, toheroa. The Fisheries Management Division has also been concerned with fisheries management research with considerable attention to tuna fisheries, and to commercial rock oyster and mussel culture. Victoria University has also been involved in mussel culture research in the Marlborough Sounds.

The University of Canterbury, in Christ church, has recently set up a formal Estuarine Research Unit under Dr. Malcolm Jones. Estuarine studies have long been an interest of the Zoology Department under Professor G.A. Knox.

Portobello Marine Biological Station has a new Director, Dr. John Jillett. who took over from the original director. Dr. Elizabeth J. Batham. New Zealand marine science suffered a great loss when Dr. Batham went missing on a collecting trip in Wellington last year where she had been a visiting lecturer. At first it was thought that her sudden disappearance could have been due to loss of memory but the complete lack of any subsequent trace has led to a theory of accidental misadventure. "Betty" Batham was one of the original New Zealand Oceanographic Committee, which initiated so much of the later research and organisation of New Zealand marine science.

Considerable stimulus has been given to coastal research by the discovery of the Maui offshore gasfield off Taranaki. This has led to a major coastline survey of the west coast of the North Island by Auckland University in which their Zoology Department has been vitally concerned.

The contribution of the Museums should not be overlooked. The Auckland Institute and Museum has long been involved in marine biology with the pioneer work of A.W.B. Powell on marine benthic communities and his later work on New Zealand molluscs, still happily continuing. The National Museum in Wellington, previously known as the Dominion Museum, has strong interests in marine mammals, fish, crustaceans and molluscs. Canterbury and Otago Museums have been involved in marine biology to a lesser extent.

It would not be proper to conclude this account without reference to the role of the N.Z. Marine Sciences Society, (c/o Fisheries Research Division, P.O.Box 19-062, Wellington). The Society, which was founded in 1960 as an informal association, has now a considerable membership and produces an annual newsletter, a 60-80 page chatty account of work in progress at the various institutions throughout the country and of recent publications, but its main activities centre around its conferences. These generally take the form of a winter meeting at one of the main centres and a small summer workshop type meeting at one of the marine stations. It has also spawned more specialized meetings such as a 1973 gathering of phycologists at Kaikoura. One feature of this Society is that it helps some of the more promising students financially to attend its conferences. This year the Society has produced a N.Z. Marine Sciences Directory listing workers and their interests throughout the country.

As well as the Marine Sciences Newsletter, there are a number of more formal marine science journals. The Department of Scientific and Industrial Research has been responsible since 1967 for the quarterly "New Zealand Journal of Marine and Freshwater Research", and the Fisheries Research Division and Management Division each publish Bulletin series. The N.Z. Oceanographic Institute is responsible for "NZOI Memoirs" (until recently part of the DSIR Bulletin series), "NZOI Records", "NZOI Field Reports" and "NZOI Oceanographic Summaries". "Collected Reprints" are put out by the N.Z. Oceanographic Institute, the Edward Percival Marine Station and Portobello Biological Station.

D.E. Hurley

SOUTH AFRICA

Almost twenty South African institutions are engaged in marine biological and fishery investigations. The location of these institutions and organisations gives a reasonably good geographic coverage of South Africa's coastline, particularly as the Sea Fisheries Branch runs several smaller laboratories on the west coast as far north as Walvis Bay. A feature of the waters washing South African shores is the wide range of conditions - temperate on the west and south coasts, sub-tropical on the east coast and a region of mixing in between. The highly productive west coast waters support commercial benthic, pelagic and rock lobster fisheries which support not only the bulk of the South African fishing industry but also attract fishing fleets from other parts of the world. It is here that the fisheries research of the Sea Fisheries Branch is of particular importance. The less productive east coast waters do not support fisheries of the magnitude of those of the west coast, but are characterized by far greater species diversity. Because of this, and the large number of rivers entering into the sea, as well as the rapid industrial development in Natal, the living resources of the east coast are sensitive to environmental manipulation (e.g. in estuaries) and the effects of pollution. Hence the research activities of the CSIR and Oceanographic Research Institute, Durban.

The co-ordination of the research of the South African institutions is considered very important, as is the linking of biological-, physical-, geological-, and engineering research in the sea. In this context the South African National Committee for Oceanographic Research under the chairmanship of the President of the CSIR fulfills a vital role. Several institutions are studying estuarine ecology in relation to the deleterious effects of pollution, harbour development, the bridging of estuaries and the construction of marinas. In this connection work has been done in Richards Bay and Soldanha Bay where deep water harbours are being constructed, at Keurbooms Estuary over which a national road is to be built and at Muizenberg where a marina is being constructed. Individual workers are studying the migrations of estuarine plankton, the recruitment of dominant bivalves and the biology of *Upogebia*, Callianassa and Scylla and several institutions are investigating the growth and feeding habits of estuarine fishes.

The Division of Sea Fisheries have concentrated their researches on the pilchard fishery. Methods for estimating the size, depth and movement of pilchard and anchovy shoals from aircraft fitted with equipment which records bioluminescence have been developed. Good and bad year classes have been correlated with egg and larval densities and with changes in hydrological conditions. In certain areas these changes are due to upwelling. Tongues of cold, nutrient-rich water drift out from the coast between intervening tongues of offshore warm water. Phytoplankton productivity is extremely high in the recently upwelled water, and as the water ages the species composition changes. Zooplankton tends to concentrate at the thermoclines between the different water masses.

South Africa's contributions to the international programme for monitoring marine pollution by heavy metals, organochlorides and petroleum products were coordinated during 1974. Intercalibration of methods was essential but the programme is now going ahead.

A study of benthic distribution across the continental shelf has revealed several distinct faunistic groups which correlate with sediment types and increasing depth. The use of a new diver-operated suction sampler has revealed new species and an unusually high biomass at a depth of 20-40 cm below the sediment surface in 5-30 m. Work on rocky shores has led to a better understanding of the factors which determine the distribution of the many different species of limpets and has led to new concepts in competition theory.

During 1974 biologists in Cape Town formed a team to study the flow of energy through the kelp-bed ecosystem. The system is based on the large kelps *Ecklonia maxima* and *Laminaria pallida*. Sea urchins feed on the young plants and starfish prey on them and on the mussels which live on detritus derived from decaying fronds. Mussels in turn are the main food of commercially important rock lobsters. The food web is of course much more complex than this, and a study of the biomass, recruitment and productivity will take several years to complete, before the energy flow through the whole ecosystem can be estimated.

A.E.F. Heydorn & J.H. Day

8. MISCELLANEOUS

A SCOR/Unesco inquiry on existing lagoon research programmes

As a support to the development of networks of research programmes in the marine coastal zone, undertaken by the Unesco Division of Marine Sciences within the framework of its programme of assistance to the Unesco member states, SCOR and Unesco have engaged in a systematic and in-depth analysis of the scientific knowledge, gaps and priorities concerning the various natural environmental systems of the coastal zone, such as mangrove, coastal lagoon, estuary, etc.

Following its meeting held at the Scripps Institution of Oceanography, La Jolla, Calif., in April 1975, the SCOR/UNESCO **ad-hoc** Advisory Panel on Coastal Lagoons has proceeded further with preparing an inquiry on existing lagoon research programmes. The inquiry is an attempt to evaluate the extent of present research programmes and activities in coastal lagoons in the world. Its results will constitute a necessary background for further evaluation of scientific problems in lagoon systems, for preparing further research programmes for implementation in the various regions of the world, such as for example Asia and Southeast Asia, Africa, and Latin America.

The inquiry will soon be dispatched to a large spectrum of specialists. Forms are available upon request to the Division of Marine Sciences of Unesco, Place de Fontenoy, F-75007 Paris, France.

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
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)
IBA	International Bryozoology Association
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 Programs
SCAR	Scientific Committee on Antarctic Research (of ICSU)
SCIBP	Special Committee for International Biological Programme (of ICSU)
SCOPE	Scientific Committee on Problems of the Environment (of ICSU)
SCOR	Scientific Committee on Oceanic Research (of ICSU)
SOSC	Smithsonian Oceanographic Sorting Center (USA)
WDC-A	World Data Center A - Oceanography