

Members: nominated by IAPSO: W.H. Munk, USA (Chairman); L.R.A. Capurro, Argentina; G.C. Dohler, Canada. nominated by SCOR: D. Cartwright, UK; J.R. Radok, Australia, T. Teramoto, Japan. nominated by UNESCO: W. Hansen, FRG; M. Eyries, France; S.S. Voit, USSR; W. Horn, FRG.

WG 28. Ocean-Atmosphere Interaction (with IAMAP and IAPSO)

Terms of reference and membership being determined.

WG 29. Continuous Monitoring in Biological Oceanography (with ACMRR, UNESCO and IBP/PM)

Terms of Reference: Using the outcome of various relevant working groups of SCOR and other organizations, to review critically the present status of devices for (a) continuous observation of parameters such as pigments, particles, transparency, submarine irradiance, primary production, nutrients, and (b) continuous or intermittent sampling of organisms, and to list suitable techniques and instruments for such measurements. The WG would work, where relevant, with the Chairman or Rapporteurs of other SCOR WGs.

Members: Membership being determined.

WG 30. Scientific Aspects of International Ocean Research (with ACMRR and WMO/AC)

Terms of Reference: (1) To develop the scientific content of a comprehensive program of international cooperation in exploration and research in the ocean and its resources, taking into account the survey and proposals of the UN Secretary-General in connection with UN Resolution 2172, and also the report on International Ocean Affairs, the existing national and international programs of cooperation in ocean exploration and research, and other relevant programs and reports. (2) To comment on the practical problems of implementing such a program, including priorities and timing, taking into account the likely funds, facilities and personnel required.

Members: Membership being determined.

WG 31. East Atlantic Continental Margins

Terms of reference and membership being determined.

ANNEX IV

REPORT OF SCOR WORKING GROUP 15  
ON  
PHOTOSYNTHETIC RADIANT ENERGY

1968 Sea Trials in the Gulf of California

Sea trials were conducted by WG-15 in the Gulf of California during the period April 29 - May 22, 1968. These sea trials were conducted in accordance with plans formulated by WG-15 during its meeting August 15-19, 1966. The data obtained are directly applicable

to the problems of measuring the radiant energy available for photosynthesis and devising simple instrumentation suitable for use by biologists engaged in research on primary productivity using the simulated in situ  $C^{14}$  method.

As planned, only five of the eight members of WG-15 were involved in these sea trials; Dr. Nils Jerlov, who was represented by Dr. K. Nygard and Mr. G. Kullenberg; Prof. Alexander Ivanoff, who was accompanied by Mr. D. Bauer; Dr. Yu Ochakovsky, who was accompanied by M.A. Suslyaev; Mr. Harry Jitts, who was accompanied by Mr. David Lockwood; and Mr. John Tyler, who was accompanied by Dr. R. Smith.

An important and unexpected feature of the sea trials was the keen interest shown in the work by Mexican scientists from the Universidad Nacional de Mexico and the Instituto Nacional de Investigaciones Biologico Pesqueras, three of whom, Dr. Armin Zarur and Dr. Anna Maria Lopez from the Instituto Nacional de Investigaciones Biologico Pesqueras and Alberto Ramirez from the Universidad Nacional de Mexico, participated in the expedition. Mr. Ramirez remained with the expedition for its entire duration.

The specific objectives of the research measurements undertaken during these sea trials were:

- 1) To intercompare radiometric measurements made with various instruments, many of which had been constructed especially for these sea trials, to intercalibrate the instruments and determine the probable errors.
- 2) To collect data which would demonstrate the accuracy of estimates of photosynthetic radiant energy based on measurements made with simple instruments employing a restricted bandwidth of wavelengths.
- 3) To obtain data which would assist in the development of a simple radiometric device suitable for routine use at sea.
- 4) To test the usefulness and accuracy of the quanta-meter, a concept generated at the 1966 WG-15 meeting, and since developed into a practical instrument by Working Group member N.G. Jerlov.
- 5) To intercompare photocells, thermopiles and phototubes with respect to their suitability for measuring the total radiant energy available for photosynthesis within the bandwidth 350 to 700 nm.
- 6) To obtain data which could be used to reveal and/or study any relationship between various biological and physical properties such as temperature, optical transmittance, chlorophyll concentration, primary productivity and radiometric spectra.
- 7) To obtain data on the diurnal variation of the radiant energy available underwater for photosynthesis.

A large amount of excellent, noise-free data were obtained which are directly applicable to these objectives. In most cases the data were immediately converted to graphical displays in absolute units and were intercompared before the expedition was terminated.

The entire group met in the La Paz office of the Instituto Nacional de Investigaciones Biologico Pesqueras and again on the R/V E.B. Scripps to discuss plans for future research by the Working Group. The subjects discussed and the recommendations of the Working Group are as follows:

Report of the Sea Trials:

It was recognized that the unification of the data (taken by five groups from as many different countries, with notes in as many different languages), into a single report, represented an unusual problem. It was also recognized that the difficulties of post-expeditionary communication would also be an obstacle in writing the report of the sea trials.

It was agreed that each W.G. member would send the other members his basic data for information purposes.

It was agreed that the Chairman of WG-15 (Tyler) would be responsible for writing the SCOR report, presenting the scientific results of the sea trials.

Recommendation:

It is recommended that WG-15 remain constituted for the purpose of writing the report of the sea trials.

1969 Sea Trials:

At the 1966 meeting of the Working Group it was recommended that full-scale sea trials be conducted in June 1969. All members of WG-15 were to participate. A location was suggested, to be between the Canary Islands and the Coast of Africa. From the point of view of the members present, this date and place would still be satisfactory and some have reserved the second half of June for the purpose. However it was felt that in view of the fact that no ship had yet been secured, the time left for organizing the expedition was getting uncomfortably short.

Experience in organizing the 1968 Sea Trials has emphasized the importance of a "back-up" organization, such as the Nimitz Marine Facility, to assist in the myriad of problems associated with the ship, its equipment, and crew, and the transportation of equipment and foreign materials from many countries.

It was agreed that the Working Group would continue to plan for full-scale sea trials.

It was agreed that a "back-up" organization similar in function to the Nimitz Marine Facility at S.I.O. was a necessity.

It was further agreed that the location, per se, was not an essential feature of the full-scale sea trials, nor was the year 1969; but that a high probability of clear sky was essential to obtaining noise-free data.

Recommendations:

It is recommended that full-scale sea trials be undertaken for the purpose of collecting additional data and further testing of simple instruments for measuring the total radiant energy available for photosynthesis.

It is recommended that an appropriate individual be chosen to organize the sea trials and that arrangements be made for him to work from a suitable support facility and with a ship that can accommodate 20 scientists for a period of three full working weeks plus sea-travel time to and from the work area. During this time WG-15 should have the exclusive use of the ship.

Publications:

Members of the WG present agreed that sufficient progress had been made to warrant the publication of a monograph covering the subject of "Photosynthetic Radiant Energy in the Sea". This monograph would bring together current knowledge of radiant energy and primary productivity in the sea. Some suggested topics to be covered were:

Radiant energy in the sea, including data on radiant energy and attenuation coefficients for types of ocean water.

Instrumentation for measuring radiant energy.

Analytical techniques for determining primary productivity using C<sup>14</sup>: (in situ and simulated in situ).

Descriptions of equipment for C<sup>14</sup> work.

Relationship between radiant energy and photosynthesis.

Review of WG-15 reports.

Notation for Optical Oceanography.

Diurnal variation of radiant energy.

Estimates of radiant energy in the sea based on simple measurements at specified wavelengths.

Description and use of quanta meter.

It was suggested that the Chairman (WG-15) act as editor and that suitable sections be assigned to the various members of the Working Group. It was also suggested that at an appropriate time the Working Group should meet to work over the manuscript. Mr. Jitts stated that he would be pleased to act as host to the group at CSIRO.

Recommendation: It is recommended that Working Group-15 undertake the preparation of a monograph as outlined and that arrangements be made to have the manuscript professionally published in book form (perhaps by UNESCO).

It is recommended that Working Group-15 plan to meet to work on the manuscript at an appropriate time and place. The time and place will become evident with progress on the monograph and will be communicated to SCOR by the Chairman WG-15.

J. Tyler

## ANNEX V

### REPORT OF WORKING GROUP 23 ON ZOOPLANKTON LABORATORY METHODS

#### Meeting in Washington, 25 - 30 March 1968

The first meeting of WG 23 was held on 25 - 30 March 1968 in Washington, D.C. at the invitation of the Office of Oceanography and Limnology of the Smithsonian Institution. The following persons participated:

MEMBERS: Chairman, V. Kr. Hansen (Denmark); H.J. Flügel (FRG); B. Kimor (Israel); H.F. Steedman (UK); T. Tokioka (Japan); M.E. Vinogradov (USSR).

OBSERVERS: D.M. Damkaer (Smithsonian Oceanographic Sorting Center); D.J. Faber (Canadian Oceanographic Sorting Center); H.A. Fehlmann (SOSC); A. Fleminger (Scripps Institution of Oceanography); N.C. Hulings (Mediterranean Marine Sorting Center); P.A. McLaughlin (SOSC); E.J. Ferguson Wood (Institute of Marine Science, Miami).

A wide range of subjects pertinent to plankton fixation and preservation was discussed