

PLANKTON COMMITTEE

Chairman: Prof. G. Hempel
Rapporteur: Mr K. Sherman

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1. The Committee met on 27 and 28 September, and in addition on the 1 October to allow sufficient time to discuss the 36 papers submitted.
2. The Administrative Report was accepted without change, the Agenda and timetable adopted, and the list of national representatives reviewed with changes noted.
3. To make the Administrative Report more informative and to encourage greater comparability in reporting national activities, the Chairman will produce general guidelines for the drafting of the national contributions on biological oceanography.
4. Submissions to the list of plankton publications pertinent to the Committee were limited to five countries. The proposal from the chair to discontinue the production of the list was not accepted. Some members felt that the list - fragmentary as it is - serves their needs. Efforts will be made by the Committee members to provide better coverage of the more important contributions in each of the countries. Contributions from the US and Canada will emphasise studies on the Atlantic coast. Members were requested to list those contributions to ICES which are subsequently published.
5. The Chairman requested comments on the content of the introduction to the plankton chapter in the Annales Biologiques (C.M.1977/L:14). There was general agreement that the document was most useful and should in the future include contributions from both sides of the Atlantic.
6. The report by Dr Fraser on the status of the Plankton Identification Sheets (C.M.1977/L:20) was noted with appreciation. In addition to a number of contributions in preparation (Scyphomedusae, pelagic Decapoda, Silicoflagellates, Cirriepede larvae, Ciliata and decapod larvae), the editor suggested that a Sheet be produced on fecal pellets in the plankton. A suggestion for authorship was made and will be communicated directly to the editor. The Committee noted the difficulties associated with the initiation of a new joint session with CIM. Lack of detailed knowledge of the life histories of Mediterranean fishes have hampered progress.

7. The Committee endorses the continuing effort of the ICES Study Group on the Flushing Time of the North Sea. Resulting information will be of particular use in estimating the advection of planktonic populations including fish eggs and larvae throughout the area.
8. The desirability of sampling for nutrients on an opportunistic basis in the open North Sea as recommended in C.Res.1976/4:6 is endorsed by the Plankton Committee. These nutrient data will be used in establishing baselines and monitoring variability.
9. The Committee recognises the increasing interest in, and importance of, marine ecosystem studies, particularly with regard to the influence of predators and their prey on fluctuations in fish stocks. Considering this interest, the Committee theme for the 1978 meeting will focus on the trophic interactions between predators and prey in the plankton and benthos and their actual or potential impact on larval and 0-group fishes.
10. The Committee discussed the plans for moving ahead with the work of the Working Group on the Distribution of Larval Fish. The Working Group will start its action by correspondence, leading to a meeting in the second quarter of 1978. Delegates have been requested by circular letter to nominate members for the Working Group.
11. A review of the draft Agenda for the Second Symposium on the Early Life History of Fish was given by the Chairman. FAO, ICNAF, IABO, and SCOR have expressed their willingness to co-sponsor the Symposium.
12. Thirty-six scientific contributions were presented to the Committee. The papers were presented under two major and several minor categories: 1) contributions to regional field studies (primary production; secondary production; and trophic interactions), 2) contributions to general, experimental, and methodological studies (sampling variability; development of fish eggs and larvae; large-scale experiments).
13. Summary of Field Studies
 - a) Dinoflagellates; Bacteria; pH cycling.

An unusual dinoflagellate bloom of Prorocentrum was observed off the French Atlantic coast (C.M.1977/L:9) and an outburst of the blue-green nitrogen-fixing dinoflagellate, Trichodesmium was reported off west Africa (C.M.1977/L:17); no toxic effects were reported. Mortalities of lug worm Arenicola were associated with a bloom of the dinoflagellate Gyrodinium aureolum off the south coast of Ireland. The origin of the bloom in relation to environmental conditions is discussed in C.M.1977/L:32. Although the authors speculate on probable causes of the blooms, data are insufficient to clearly identify the factors responsible. Contribution C.M.1977/L:18

deals with measurements of bacteria in the western Mediterranean. Using linear correlation and principal component analyses, vertical variations in bacteria populations at 12 locations are examined in relation to temperature, nutrients, density, oxygen, and ammonia. In another contribution (C.M.1977/C:3) time-series measurements of pH showed no increase in the German Bight from 1969 to 1975. The interaction between biogenic production of CO₂ and acid wastes from Titanium are examined, and acid wastes appear to be neutralised by CO₂ during the normal events in the annual production cycle.

b) Primary production; hydrography.

Distributions of phytoplankton species composition diversity, and abundance for 1973 to 1976 off the Dutch coast were given in document C.M.1977/L:2. The Committee took special note of this study in 1975, and encouraged its continuation. The Committee suggested that this fine study could be further enhanced with statistical treatment of within and between year variations. Contribution C.M.1977/C:2 concerning flushing times of the North Sea stimulated much discussion. The Committee took note of the inclusion of biological characteristics in selecting the areas. Studies of available hydrographic, chemical, and biological data will be examined in each of the areas and the results reported to ICES in 1978. Contribution (C.M.1977/L:34) described the interaction between seasonal changes in regional productivity in Icelandic coastal waters and the forcing functions of winds and stratification in driving the annual production cycle. The production maxima is in summer. A secondary peak observed in spring is hypothesized to be influenced principally from runoff and nutrient enrichment. Observations made on changes in the distribution and abundance of phytoplankton and zooplankton during the joint USSR-Icelandic surveys of the Norwegian Sea and Icelandic waters are given in C.M.1977/H:21.

c) Secondary production; zooplankton; ichthyoplankton.

Several contributions provided new insight on the importance of coelenterates in the energy budget of marine ecosystems. Results of survey data from the North Sea indicated that in 1976 the major species of Scyphomedusae were Cyanea capillata, C. lamercki, and Aurelia aurita (C.M.1977/L:15). The importance of Bolinopsis infundibulum as a predator feeding heavily on copepods and larval fish off the Scottish coast was reported in C.M.1977/L:16; apparently this species produces two annual generations, one in spring, and the other in summer which maintains an overwintering breeding stock. In the Kiel Bight, Scyphomedusae play an important role in the production of organic matter. Total weights of medusae organic content were four times higher than copepods from June to October (C.M.1977/L:4). Continuation of work on this important

group of zooplankton is desirable, particularly from the point of view of predator-prey interaction and the flux of the annual production cycle. Production estimates of the eggs of cod and plaice were reported in C.M.1977/F:21. Contributions C.M.1977/L:7, L:23 and L:24 describe the distributions of ichthyoplankton, thaliaceans, and chaetognaths off northwest Africa. These results will be reported more fully at the CINECA Symposium in April 1978.

Approximately one dozen papers on the biology of ichthyoplankton and its relationship to the environment were scattered among the contributions to the Fish Committees. The Committee requests that the Consultative Committee examine this situation to ensure that all papers dealing with the biology and ecology of the early life history stages of fish be dealt with by the Biological Oceanography Committee.

d. Interactions between trophic levels

Research in trophodynamics in marine ecosystem studies is increasing. Contributions dealing with larval fish and zooplankton interactions on Georges Bank included an initial attempt to estimate secondary production on Georges Bank (C.M.1977/L:30). Estimates given in the paper of 80 mg C/m²/day were considered high in comparison with the North Sea. Increased abundance of the copepod Pseudocalanus minutus was suggested as the reason for increased growth and lower mortality of larval herring observed during two winter periods (C.M.1977/L:27). In contribution C.M.1977/L:28, competition among the larval fish community was compared; no significant differences in diets of cod and haddock larvae based on stomach analyses was observed. Studies of cod feeding described in C.M.1977/L:33 indicated that the lack of correlation between the densities of naupliar prey items in the sea and feeding intensity, was related to satiation of the larvae in high densities of up to 600,000 nauplii/m³.

14. Summary of Spatial variability; Experimental, and Methods Studies

a) Spatial variability

The spatial structure of phytoplankton turnover was examined in C.M.1977/L:21. In periods of strong winds, variance in spatial structure was significantly correlated with wind stress. In calm periods, biological influences were the most important source of variability in distribution. Variations in zooplankton distributions were investigated in C.M.1977/L:36, based on replicate mesoscale and microscale sampling in the Kiel Bight. Contribution C.M.1977/L:5 dealing with a composite sampling strategy generated considerable discussion. While the method may have application for small areas, several Committee members indicated that the difficulty in obtaining measures of sample variance appear to limit the applicability of the approach. In C.M.1977/L:12, the application of statistical time-series methods for detecting sex ratios in copepod cohorts was described. Linear regression techniques were used in C.M.1977/L:13 for examining relationships between variations in copepod lengths and temperature.

b. Experimental

In contribution C.M.1977/L:19, dealing with laboratory studies of the development of mackerel eggs, the authors compared viability levels in egg development based on data resulting from 1) stripping dead and live fish, and 2) natural spawnings in a basin, with egg collections made at sea. The latter method gave the best results. From the discussions, it appeared that the results were not consistent with high hatching survival levels of 85% achieved in Plymouth with eggs stripped from running-ripe females. The reasons for the discrepancies in results are not clear. It was suggested that the results may have been biased by the small sample size of gravid females in the experiment. Contribution C.M.1977/L:31 compared the survival of cod and haddock larvae at different temperature levels. Growth, respiration, and metabolism levels were similar for both species. Haddock growth was slightly greater at 9C° than for cod at 10C°. The significance of this subtle difference will be examined in continuing studies. Recovery periods from delayed feeding of up to 8 days were reported for both species. The utility of large enclosures to examine the relationships between phytoplankton and secondary production was demonstrated in contribution C.M.1977/L:35; maximum conversion of primary productivity to the next trophic level was 29%. Two contributions dealt with the effects of oil exposure. Chlamydomonas cultured in oil failed to show enhanced mutation after three weeks of exposure (C.M.1977/E:69). The predator-prey balance in a copepod /alga experimental ecosystem was significantly disrupted by the addition of naphalene; reduced dinoflagellate motility enhanced copepod predation (C.M.1977/E:70).

c. Methodological

The increasing use of biochemical methods in plankton and ichthyoplankton studies was demonstrated in the utilization of ATP in diagnosing phytoplankton biomass loss in high-temperature thermal effluents (C.M.1977/L:8), and in the use of RNA/DNA ratios as indicators of larval fish condition (C.M.1977/L:29). Application of an otolith reading technique for determining the age of herring larvae was described in C.M.1977/L:26. And in C.M.1977/L:10, an advanced bongo sample design was described that incorporates opening-closing, temperature, depth, TV, and photographic systems. The Committee expressed special interest in the sampler and requested a report on the performance of the prototype for the 1978 meeting.

Communications

A full list of communications will be given in Procés - Verbal de la Réunion 1977.

The Plankton Committee recommends that:

IV (1) ~~The Delegates are urged to encourage greater participation and continuity in attendance of biological oceanographers at the Statutory Meetings. This is of particular importance now that the Council is encouraging studies of marine ecosystems.~~

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The Plankton Committee recommends that:

V(1) for the 66th Statutory Meeting in 1978, the Committee invite papers on "Trophic interactions between predator and ^{prey in the plankton and} benthos and their actual or potential impact on larval and 0-group fishes."