

COMITÉ DU PLANCTON

par M.-L. Furnestin

Belgium

(R. De Clerck)

Studies on zoo- and phytoplankton distribution off the Belgian coast were intensified, especially in relation to the disposal of domestic and industrial waste water.

Canada

No report received.

Denmark

(E. Smidt)

Home waters

Since the investigations from Danish light-vessels were stopped at the beginning of 1971, no field work has been undertaken.

In the laboratory some preliminary experiments on rearing of fish eggs and larvae were made.

West Greenland waters

Measurements of primary production (C-14 method) have been made in the coastal waters of Godthåb.

In connection with hydrographic observations, 43 stramin net samples (ring diameter 2 m, oblique hauls from ca. 50 m depth) were taken in May-October on four standard east-west sections in the Davis Strait (o'f Egedesminde, Holsteinsborg, Sukkertoppen and Godthåb). Displacement volumes were measured. Invertebrates and fish eggs and larvae were sorted and counted.

Programme for 1972

The investigations in West Greenland waters are continued.

France

(M.-L. Furnestin)

1. Travaux de l'Institut des Pêches maritimes. Laboratoire de Nantes

Ichthyoplancton. Selon le thème principal, l'importance de la ponte des Clupéiformes (sardines-anchois) a été évaluée dans le golfe de Gascogne, d'après les oeufs et larves récoltés au cours des campagnes trimestrielles 1971 et d'après la prospection de zones-test établies sur les frayères. Des relations ont été faites entre la situation des aires de ponte et les conditions hydrologiques. Communication au CIEM 1971, publication dans Rev. Trav. ISTPM 35 (1) et dans Ann. Biol. 27 (S. Arbault et N. Lacroix).

Travaux d'identification: oeufs et larves de Scomber scombrus, Solea solea, Microchirus variegatus, Pegusa lascaris, Arnoglossus laterna, Trachurus trachurus, Pagellus centrodontus et autres espèces d'importance commerciale moindre.

Relevé des oeufs et larves de morue récoltés au cours de la campagne dans le sud de la Mer du Nord et en Manche orientale.

Zooplankton. Evaluation volumétrique du plancton récolté au cours des campagnes trimestrielles 1971.

Etude qualitative de ces récoltes sur le plateau continental du golfe de Gascogne (140 stations). Publication des résultats antérieurs dans Rev. Trav. ISTPM 35 (4) (J. Beaudouin).

Examen général du plancton recueilli sur les zones-test. Publication dans Ann. Biol. 27.

Programme pour 1972

Pêches au chalut à larves pour capture de post-larves. Evaluation de l'indice gonado-somatique et examen de contenus stomacaux de la Sardine.

Etude qualitative et quantitative des récoltes annuelles de zooplancton dans le Golfe de Gascogne.

2. Travaux des laboratoires conchylicoles de l'Institut des Pêches

Les laboratoires ont poursuivi l'étude du microplancton et des larves de Mollusques comestibles dans les centres ostréicoles en fonction des conditions hydrologiques.

Leurs observations ont permis de mettre en évidence quelques faits singuliers :

- un retard de la poussée phytoplanctonique printanière qui n'a atteint son maximum qu'en juillet-août,
- un polymorphisme chez Biddulphia sinensis Gréville dans la région de Marennes,
- une prolifération de Noctiluca scintillans en décembre 1971 dans le secteur de Quiberon, y provoquant un phénomène d'eaux rouges,
- la présence, inhabituelle dans la région, de Gonyaulax polyedra qui, en Morbihan, fut associée, comme en 1964, à une mortalité de naissains d'huîtres plates en rivièrre de la Trinité.

Programme 1972

Poursuite des études sur le microplancton et les larves de mollusques dans les centres conchylicoles.

3. Travaux du Laboratoire de Biologie animale (Plancton) Marseille

Etude du plancton profond de l'Atlantique oriental:

a) poursuite des investigations dans le golfe de Gascogne (en collaboration avec ISTPM): Siphonophores et Crustacés.

b) analyse de récoltes le long des côtes du Maroc et du Rio de Oro: synthèse des résultats concernant les Euphausiacés (compte-rendu au CIEM 1971 (J.P. Casanova)) premiers résultats relatifs aux Décapodes.

Méditerranée: Etude systématique, morphologique, écologique, biogéographique, et développement larvaire des Euphausiacés (B. Casanova) et des Ptéropodes (J. Rampal) sur l'ensemble du Bassin.

Zooplancton du golfe du Lion. Relations avec l'hydrologie au cours d'un cycle annuel.

Participation à l'élaboration des programmes de l'ECM (Etude en Commun de la Méditerranée), (M.-L. Furnestin).

Programme pour 1972

Synthèse, pour quelques groupes, des résultats obtenus depuis 1967 sur le plancton profond de l'Atlantique eurafricain. Distribution verticale du plancton dans l'Atlantique oriental d'après quelques stations de longue durée du "Meteor" (1967).

Méditerranée : continuation du programme antérieur. En outre

a) étude des Chaetognathes du Bassin oriental (détroit Siculo-Tunisien et Tripolitaine).

b) étude quantitative et qualitative du plancton de quelques étangs littoraux.

Germany

(J. Krey)

Institut für Meereskunde der Universität Kiel (Prof. Dr. J. Krey, M. Hillebrandt, A. Speer, Dr Lenz, Dr Horstmann, V. Smetacek, Doz. Dr Zeitzschel).

In 1971 the long-term plankton ecological observations in the Kiel Bight were continued with an overall number of more than 1 700 different samples. (Krey).

Three years' observations on the differentiations of zooplankton composition were finished and are being published as a thesis (Hillebrandt).

Microcalorimetric investigations on coastal zooplankton in the Kiel Bight were continued and finished and are also being published as a thesis (Speer).

Methodological investigations on a new type of plankton sampling based on the pumping system are continued and presently in examination in the upwelling area near the West Coast of Africa (Lenz).

Research work on the influence of domestic sewage are being continued and partly published as a thesis (Horstmann).

A special research project on the interaction between plankton and its sedimentation was started with a number of different special problems, e.g. decomposition of chlorophyll and carotinoides (Smetacek, Zeitzschel).

Bundesforschungsanstalt für Fischerei - Institut für Küsten- und Binnenfischerei, Hamburg

Plankton sampling for the study of the distribution of Crangon larvae in relation to hydrographic and other factors along the German Sea coast were continued.

Routine investigations on the plankton composition in the Elbe estuary were also continued.

Institut für Meeresforschung, Bremerhaven

Taxonomy of plankton diatoms of the Indian Ocean (Dr Simonsen).

Lower fungi as parasites of marine phytoplankton, concluded. (Dr D.K. Chakravarty).

Studies on the frequency of lower fungi in marine waters (Dr Gaertner).

Biologische Anstalt, Helgoland

Research activities of the Planktology Department in 1971 :

1) The all-year-round observations on species composition of the plankton and quantitative plankton distribution in relation to hydrographical and chemical water properties were continued at station "Helgoland Reede". The sampling included qualitative and semi-quantitative investigation of living phytoplankton from daily net samples as well as preservation of a water sample per day for plankton counting with the sedimentation technique.

Usually, three times a week, quantitative seston analyses were made including 140 seston weight, 140 chlorophyll-a and 149 protein (as albumin equivalents) determinations. From 133 water samples determinations of inorganic phosphate, nitrite, nitrate, ammonia, silica, calcium, magnesium and pH were made. Salinity and water temperature were measured daily. The transparency of the water was determined by Secchi disc.

2) From 1 March to 31 October 1971 daily sampling of surface water was continued (as in the past two years) from four German light-vessels in the southern German Bight. Phytoplankton is being counted quantitatively for succession analysis in different water masses in the German Bight.

3) Four cruises with RV "Friedrich Heincke" were made in the German Bight to investigate phytoplankton and zooplankton distribution and abundance along with salinity and temperature measurements (128 samples from 42 stations). Bathythermograph and Secchi disc measurements were made on most of the stations.

4) From 1-18 June 1971 a cruise to the sea areas south-west and west of Ireland was made with RV "Friedrich Heincke". The distribution of eel larvae (especially of leptocephali of Anguilla anguilla) was investigated near the continental slope in relation to hydrographical, chemical and plankton measurements in the upper 200 m of water.

On 17 stations, 66 temperature and 134 salinity measurements were made in addition to vertical profiles with a salinity-temperature probe for assessing the depths of the thermocline. 134 water samples for quantitative phytoplankton counts were taken, and micro-zooplankton was concentrated out of 2 to 4 litres of water. At all stations vertical profiles of micro-nutrient data were measured using an Auto-Analyzer (phosphate, nitrite, nitrate, ammonia and silica).

Institut für Hydrobiologie und Fischereiwissenschaft, Hamburg

The investigations on the primary production in the upwelling areas off NW Africa have been continued. Especially the dissolved and particulate organic carbon as well as the number of phytoplankton cells have been studied (Gillbricht).

In zooplankton, the studies on the material, collected by the Longhurst-Hardy Plankton Recorder (L.H.P.R), in different areas of the North Atlantic were finished.

As for samples from the Norwegian Sea, special emphasis was laid on the horizontal and vertical distribution of invertebrates, mainly of copepod species and their diurnal vertical migrations (Krause).

The composition of zooplankton hauls from the sub-tropical NE Atlantic was used to test the catching efficiency of the L.H.P.R. during the different conditions of towing (Schirmer).

Iceland

(I. Hallgrímsson)

Phytoplankton. Primary production measurements in Icelandic waters were carried out in the same manner as previously, i.e. performed according to the ^{14}C technique on samples from the standard depths 0, 10, 20 and 30 m. Samples for quantitative analysis of the phytoplankton were collected at each level where productivity was measured.

In an area covering the coastal shelf and adjacent deep waters extending from a section off Snæfellsnes on the west coast of Iceland to a section a few miles east of Westman Islands (Háfadjúp) off the south coast, measurements were made in 4 surveys during the periods 15 - 20 May (36 stations), 6 - 15 August (63 stations), 28 September to 10 October (39 stations), 7 - 13 November (46 stations). In the August survey, productivity measurements were also made east of Háfadjúp along the south coast, covering the mixing area southeast of Iceland as well.

In the waters off the north-western peninsula and off the north coast productivity measurements were made on 30 stations in late May.

Zooplankton. Zooplankton sampling was carried out at 440 stations in the following 11 surveys in 1971 :

In the waters off the W and SW and S coast of Iceland 294 stations were worked in 7 surveys.

Off the W and N coasts 71 stations were worked in 2 surveys in May and August.

In June, 52 stations were worked in the Norwegian Sea E and NE of Iceland.

In July, 23 stations were worked NW of the Shetland Islands.

The sampling was carried out with a Hensen net from 50 - 0 m and with Icelandic high speed samplers from two different depths.

The Continuous Plankton Surveys between Reykjavík and New York and Reykjavík and Leith, worked in cooperation with the Oceanographic Laboratory, Edinburgh, were continued.

Ireland

(F.A. Gibson)

Ireland has undertaken no plankton work in 1971.

Italy

No report received.

Netherlands

(P. Korringa)

Throughout the year 1971 various cruises of the Dutch research-ships "Tridens", "Willem Beukelsz", "Schollevaar" and "Stern" have been made with the purpose to collect plankton samples. The two larger ships operated predominantly in the North Sea, the latter two in the Wadden Sea. The samples were used to study quantitatively the larvae of herring, cod and brown shrimp.

In January special series of samples were collected and dispatched on request of the Lowestoft Laboratory for quantitative study of plaice eggs.

The larvae of the brown shrimp were remarkably scarce in the first months of the year 1971 in comparison with the year 1970. The large scale predation on the shrimps in the Dutch coastal waters by cod, as reported in the meeting of the Shellfish and Benthos Committee during the Annual Meeting of the Council held in Helsinki, had indirectly led to a serious reduction in the production of brown shrimp larvae. In June, the number of shrimp larvae reached a more normal level. As usual, very few shrimp larvae were found in the last four months of the year.

The study of the number of cod larvae occurring in the Dutch coastal area in the month of January revealed a smaller number of larvae and evidently these larvae were produced somewhat later in the season than the year before.

The number of herring larvae migrating into the Wadden Sea in the spring of 1970 was considerably smaller than the year before, but these juvenile herrings were of a larger size and came somewhat earlier, which led to the conclusion that they must have been born in the Central North Sea in September, whereas the 1970 juveniles which were smaller but came later and in greater numbers, must have been born late in the year before in the southern North Sea. In September samples of herring larvae were collected in the spawning areas near the English north-east coast. They were less abundant than the year before. In the southern North Sea, the Channel included, the number of herring larvae was likewise smaller than the year before.

In mid-summer, especially in the month of July, the plankton in the Dutch coastal waters showed unusual features which could have been brought about by a prolonged spell of sunny weather with limited wind velocities. A dinoflagellate bloom made the mussels in the Oosterschelde unfit for human consumption during the whole month of July which led to closure of the sales. Again it was gastro-intestinal disturbances and not paralytic symptoms which were caused by consumption of such mussels, ascribed to heat-resistant substances presumably produced by flagellates such as Dinophysis acuta and Prorocentrum redfieldi. In the same period, blooms of Noctiluca miliaris produced brick-red patches of remarkable dimensions in the vicinity of the Dutch coast. Jelly-fish of the genus Cyanea of unusually large dimensions were observed in the in-shore waters bathing the beaches early in July.

Norway

(G. Berge)

I. Institute of Marine Research

Phytoplankton (G. Berge). 1) The primary production rates and the standing stock of phytoplankton were measured at the coastal banks west of Norway, with emphasis on the nursery grounds of cod and herring. The programme is a long term monitoring of environmental conditions during and after hatching of the fish larvae, and includes also light and turbidity measurements and particle size frequency analysis. The primary production rates per unit of chlorophyll at standardised conditions (PI) was used to compare local and annual changes in the "vitality" of the producing plankton.

2. The statistical average PI of the coastal waters was used for comparison with polluted fjords. In, for instance, the Ranafjord, a raised level of PI was recorded, and was assumed attributable to industrial release of great amounts of NH_4 . The opposite condition was recorded for instance in the small Friørfjord, where harmful industrial wastes probably was responsible for a PI approaching zero.

3. From 28 May to 29 June a survey of primary production, chlorophyll, particle size frequency and nutrients was undertaken in the Barents Sea.

4. A survey of primary production, chlorophyll and particle size frequency was made from 15 March to 12 May in the northern Norway, from Lofoten to Finmark, covering the nursery grounds of capelin.

Zooplankton (Kr. Fr. Wiborg). Sampling was continued at the permanent oceanographical stations along the coast of Norway and at Station M in the Norwegian Sea. Displacement volumes of the samples were determined, the material later worked up by the "short-cut" method, and the data filed on cards.

For the years 1969-1971 the average plankton volumes in ml per m^2 of sea surface at four stations were as follows :

Year	UTSIRA SW Norway	SOGNESJØEN W Norway	SKROVA NW Norway	INGØY N Norway	
1969	13.6	8.8	24.8	-	ml/ m^2
1970	14.4	11.2	40.8	23.2	"
1971	17.6	17.6	44.0	25.6	"

Salps were abundant in 1971, taken at Station M in September and October, and at Skrova in October. They were also observed during cruises along the coast.

Investigations in connection with commercial fishery for zooplankton were carried out in coastal areas at Bergen and Møre in May and June, with sampling with Juday net "8/40" and Clarke-Bumpus samplers in the upper 30 m. "Calanus"-plankton in quantities up to 20 ml/ m^2 was recorded, the sea surface in one case being coloured red by the plankton. Recordings with a SIMRAD echo sounder were identified as concentrations of plankton. About 50 metric tons of Calanus were fished commercially, partly with fine-meshed trawls, partly with traps anchored near the coast.

II. Statens Biologiske Stasjon, Flødevigen

Work was continued on the occurrence of neuston and hypo-neuston, particularly ichthyohyponeuston, in offshore waters. (D. Danielsen, S. Tveite).

III. Tromsø Museum, Marinbiologisk Stasjon, Tromsø

1) The taking of bi-monthly routine stations in some fjords in Troms and Finmark was continued. Displacement volume assessments are being based on divided vertical hauls with 500 μ mesh Juday net.

2) Looking particularly for pelagic fish eggs and larvae, coastal waters of Nordland, Troms and Finnmark were sampled by means of the Clarke-Bumpus plankton samplers and Zaitsev hyponeuston net.

3) In the Skjomen-Ofotenfjord, routine quantitative and qualitative plankton investigations were continued by means of divided vertical hauls with a 200 μ mesh Juday net. Samples were taken monthly during the summer season and bi-monthly during the rest of the year.

IV. University of Bergen, Biological Station, Espegrend

The deep-water community of a Norwegian fjord. This project, designed to elucidate ecological, particularly the trophic relationships within a deep-water plankton community, was continued in 1971. A revised programme of sampling of the population throughout the water column was started at the beginning of the year and is still continuing. Analysis of the major components of the macroplankton and mesoplankton is progressing. (J.B.L. Mathews).

The ecosystem of a west Norwegian "Poll". This project, which is aimed at as complete an understanding as possible of the dynamics of a largely isolated marine community, includes a study of the zooplankton. After designing the most suitable stratified programme for the area, determinations of variation of biomass and of species composition and abundance in space and time have been carried out. The results are being worked up and sampling is continuing. (U. Lie)

V. University of Oslo, Institutt for Marin Biologi, Avd. A/C

1) Chemical studies were made of the compounds produced by photosynthesis in marine algae. (E. Føyn & S. Hanneborg).

2) Investigations were started on the uptake of nitrogen in plankton algae. (E. Føyn and B. Løken; T. Andersen).

3) Studies of long-term changes in the composition of the Oslofjord zooplankton were continued (H. Hovde; F. Beyer).

4) Investigations were started on the concentration of heavy metals in selected species of zooplankton from the Oslofjord and coastal waters outside. (L. Kirkerud; F. Beyer).

5) Investigations were started on the local ecology of euphausiids. (S. Fevolden; F. Beyer).

6) Diurnal variations in the vertical distribution of certain zooplankton species in the vicinity of the bottom were studied in Kiel Bay (I. Hesthagen).

University of Oslo, Avd. B.

I. Phytoplankton surveys

1) The investigation of the spring phytoplankton in the spawning areas for cod and herring (Møre-Lofoten) was continued; in collaboration with the Marine Research Institute, Fisheries Directorate and part of the Norwegian IBP-PM programme (I. Nygaard).

2) An oceanographic survey of the inner Hardangerfjord with the object of obtaining a basis for possible future studies of the effect of changes in the fresh-water supply. The phytoplankton part (T. Braarud, A. Dick).

- 3) A survey of the phytoplankton in coastal waters of the southern Norwegian coast in autumn and winter. (In collaboration with the Marine Research Institute, Fisheries Directorate, Bergen) (K.E. Berg).
- 4) A study of the phytoplankton of Skjomen, as part of a broader oceanographic project organised by the Tromsø Marine Biological Station (B. Schei).
- 5) In collaboration with the University of Bergen an all year survey of the phytoplankton of Nordåsvatn near Bergen was continued (A manuscript is under preparation) (K. Tangen).

II. Special phytoplankton studies

- 1) Taxonomic studies with the use of transmission and scanning electron microscopy were continued, on coccolithophorids (K.R. Gaarder and B.R. Heindal), diatoms (G.R. Hasle and B.R. Heindal) and microflagellates (J. Throndsen).
- 2) The study of Coccolithus huxleyi, its life cycle, fine structure and coccolith formation has been continued. (D. Klaveness).
- 3) Investigations on nanno-phytoflagellates have been continued (J. Throndsen)
- 4) Experimental work has been continued on changes in the content of chloroplast pigments and enzymes in plankton algae induced by different light regimes and by different nitrogen sources (E. Paasche).
- 5) Electron microscope studies on coccolithophorids from the German Rossbreiten Expedition, 1970 (B.R. Heindal).
- 6) The morphology and distribution of Thalassiosira subtilis and allied species have been investigated (G.R. Hasle).
- 7) The morphology, taxonomy and distribution of Thalassiosira eccentrica and allied species have been investigated (G.A. Fryxell and G.R. Hasle).
- 8) An investigation has been initiated on the effect of elevated temperatures on the growth of the phytoplankton of the Oslofjord. This investigation was prompted by the announcement of plans of a power plant using fjord water for cooling purposes (E. Dahl, E. Paasche).
- 9) The growth of marine plankton diatoms under conditions of silicate limitation is being studied (E. Paasche).

Programme for 1972

- 1) Phytoplankton surveys: a) Investigations mentioned under 1971 - I 1)- 4) will be continued.
- 2) Special phytoplankton studies. a) Studies mentioned under 1971 - II 1) 2), 3), 4), 8) and 9) will be continued.
b) New projects : Experiments on primary production and photosynthetic activities in nanoplankton flagellates (J. Throndsen).

VI. University of Trondheim, Biological Station and Norwegian Institute of Seaweed Research, Trondheim

During 1971 weekly sampling of phytoplankton, zooplankton and nutrients has been carried out in the Trondheimsfjord. Bioassays have been carried out on fjordwater with various enrichments, recording growth responses of diatoms and dinoflagellates. Pigments and chemical compositions of phytoplankton have been studied in natural populations and diatom cultures. Investigations on growth response in dialysis cultures in natural seawater with Zn added have been carried out. Studies have been started on vitamin requirements and ability of growth on organic N and P sources for dinoflagellates as well as growth response on various fractions of river water. Toxicity tests have been carried out on dinoflagellates.

Poland

(W. Mańkowski)

The plankton investigations during 1971 were carried out very intensively, especially in the area of the Southern Baltic. The material collected by means of Hensen, Nansen and Copenhagen nets formed the basis for a number of zoo- and phytoplankton studies from different points of view.

The phytoplankton consisted of 37 species : 8 species of Dinoflagellata, 5 species of Cyanophyceae, 9 species of Chlorophyceae and 15 species of Bacillariophyceae. In all seasons diatoms were the dominant group.

Further investigations concerned the micro-zooplankton and its production which was estimated through some catches of biomass in the annual cycle. On this basis it has been proved that the production of micro-zooplankton in the Baltic this year was high, amounting to 60 g of wet mass per 1 m² of sea surface. Ad hoc collected material gave information on the spatial distribution of zooplankton. The analysis showed that the major accumulations of zooplankton existed in the top water layer (0-30 m) and then in the bottom water layer (70-110 m). The intermediate layer (30-50m) was the poorest one. This layer is characterised by lowest temperatures all over the year.

Observations were also made on the occurrence and the distribution of eggs and larvae of commercial fish, such as cod, sprat, flat fish. The cod eggs occurred during the whole spawning period in small quantities, less than 100 egg/1 m² of the sea surface. The cod larvae were also found in small quantities with maximum of 20/ 1 m². Thus, the cod spawning intensity was very low.

On the contrary, sprat spawning was very good. Its eggs accumulated in quantities amounting to 1000/lm². Sprat larvae were also numerous, up to 206/lm².

Apart from the investigations mentioned above, a study of primary production was conducted by the 14C method as well as by phytoplankton biomass estimated from chlorophyll a contents.

In 1970, the following subjects were worked on :

Ringer, Z.	Phytoplankton of the Southern Baltic in 1971.
Renk, H.	Primary production and plankton biomass in the Southern Baltic in 1971.
Ciszewski, P.	Spatial and time distribution of zooplankton biomass in the Southern Baltic.
Mańkowski, W.	Estimation of the production of eggs and larvae of commercial fish
Rózańska, Z.	Studies on biology and ecology of Chaetognatha in the Baltic Sea.

Spain
(J. Corral)

Atlantic phytoplankton

During the "Sahara II" cruise of the vessel "Cornide de Saavedra" to the region of upwelling off NW Africa in August and September 1971, a great number of pigment determinations and carbon uptake measurements have been made, and 600 phytoplankton samples were collected. The study of them has already been started. It has been published and preliminary account on the plankton (Inv. Pesq. 35 suppl.) and a paper about pigments and primary productivity is in press (Inv. Pesq. 36).

A study was made of the distribution of diversity values in phytoplankton of the Caribbean Sea (Margalef, Inv. Pesq. 36, in press)

Mr R. Establier has continued the study of temperature, salinity and phytoplankton at 4 stations in Cadiz Bay and has started the same work in Sanlucar de Barrameda - Chipiona.

Mediterranean phytoplankton

The distribution of phytoplankton has been studied in a transection between Corsica and Barcelona (Margalef Inv. Pesq., 35) and in an area to the south of Ebro River (Estrada, Inv. Pesq., in press). These samples were obtained by "T.G. Thompson" in spring of 1970.

A dense population of dinoflagellates were found in the Castellon harbour (San Feliu y col. Inv. Pesq. 35)

Phytoplankton general

Experimental laboratory studies in addition to field investigations have been carried out. The biology of Skeletonema costatum has been studied by J. Castellví (Inv. Pesq. 35).

The contribution of phytoplankton in forming a maximum of nitrite at about 80 m depth has been made clear by D. Blasco (Thesis, Uni.Barcelona).

Miss M. Estrada is studying local patterns of planktonic populations in laboratory cultures.

Atlantic zooplankton

A study has been finished of copepod populations in the SW of Portugal (Vives, Inv. Pesq. 36, in press). He has started a study of the samples obtained by "Jean Charcot" during the CINECA I cruise (January and February 1971) with the aim to clarify the vertical distribution of copepod populations during the stratification time, for comparison with the distribution in time and place of the upwelling.

The samples obtained during the "Sahara II" cruise are being studied in the CINECA I. cruise. The "Sahara II" cruise went through a heterogeneous hydrographic region, where one may study the influence of the different environmental factors on the distribution of many species.

Mediterranean zooplankton

Quantitative studies have been made on the annual cycle of animal biomass in surface waters near Blanes. During the last part of 1971, investigations were started on fish larvae and eggs from the Mediterranean coast of Spain, the ecology of planktonic tunicates from western Mediterranean and the planktonic larvae of some invertebrates. Studies on zooplankton in the polluted waters of Barcelona harbour have also been started.

The massive presence of Noctiluca on the coast of Cataluña in spring 1971 has been studied (López y Arté, Inv. Pesq. 35).

Zooplankton general

Laboratory work has been initiated to clarify and quantify some of the field observations. During the last three months of 1971, investigations were started on the following subjects : relations among different trophic levels in the plankton food chain, embryonic and larval development of mussels and other lamellibranches, and a study of planktonic larvae of decapod crustaceans.

Laboratorio de Santander

In order to study the distribution of anchovy and sardine eggs and larvae at the middle eastern coast of north Spain, three cruises were made during March, April and June of 1971. Some observations were also made on primary productivity at Santander Bay.

Laboratorio de Santa Cruz de Tenerife

Zooplankton sampling has been continued at several places in the Canary Islands and at the African coast. In the second half of 1971, some methodic studies were started on productivity, nutrients and planktonic biomass at an oceanic station near Santa Cruz de Tenerife.

Laboratorio de Madrid

One has started the identification of the ichthyoplankton collected at Santander as well as of the general zooplankton (chaetognathes, amphipods) collected at different places.

Two papers have been completed on copepods from Canarias (Corral, in press) and an other one on specific diversity in copepod communities (Corral, in press), and further three papers on character correlations in Sagitta enflata (Pereiro, in press) a biometrical comparative study on several populations of Sagitta enflata (Pereiro, in press) and a study on the annual cycle of chaetognathes in Castellon waters (Pereiro, in press).

Some studies were started on zooplankton samples from Ria de Arosa and in one of the first that was analysed a new species of copepod was found, Diaixis duranii n. sp. (Corral, in press).

Sweden

(A. Lindquist)

Skagerak and Kattegat

Regular sampling has been carried out of zooplankton in certain areas during a larger part of the year (gear used : net). There have not been any notices about mass occurrence of Tima bairdii and other coelenterata which in earlier years hampered the Pandalus fishery.

During April, a survey was made for immigrating eel larvae (different gears) and during October a survey for herring larvae (Gulf III sampler). Most material collected during the year has been worked up.

Baltic

Extensive zooplankton investigations have been carried out in the Baltic with the purpose of monitoring the conditions of this sea (nets).

A great number of samples has also been collected for studying the horizontal and vertical distribution of ichthyoplankton, especially of cod and sprat.

United Kingdom

1. England and Wales

(D.H. Cushing)

Studies of the life history of larval Pleuronectes platessa, have continued during 1971. Eleven plankton surveys of the Eastern Channel, Southern Bight and Flamborough areas were made during the period January to June 1971.

Plankton hauls on these surveys were made with the Lowestoft 30 multiple plankton samplers which was fitted with filters which have mesh apertures of 0.275, 0.190 and 0.061 mm respectively. The data are being processed and will be published at a later date. Further information is available from D. Harding or D.S. Tungate, Fisheries Laboratory, Lowestoft.

Inshore plankton was sampled along the English south coast between Kent and Cornwall using a Lowestoft 12" sampler. For further information contact J. Riley, Fisheries Laboratory, Lowestoft. A series of inshore plankton surveys in the Scarborough-Flamborough area were undertaken during the year for investigations of plaice eggs and larvae. For further information contact S. Lockwood, Fisheries Laboratory, Lowestoft.

Nanoplankton samples for chlorophyll analysis were taken from waters in the North Sea, in the area Scotland to Faroes, Iceland and in the Barents Sea. Further information is available from N. Reynolds, Fisheries Laboratory, Lowestoft.

2. Scotland

(J.A. Adams for J.H. Fraser)

Marine Laboratory, Aberdeen

The surveys by the research vessels from the Marine Laboratory at Aberdeen which included plankton sampling covered various parts of (i) the North Sea north of 56°N during the period February to November inclusive (ii) the Scottish west coast area in February to August inclusive and in December and (iii) the Faroe-Shetland area in January, May, August and September.

The work on plankton at Aberdeen consisted of the following items :

1. The routine collection of phytoplankton and zooplankton standing stock data (in terms of chlorophyll a and dry weight respectively) from the northern North Sea, west coast and the Faroe-Shetland area (J.A. Adams and I.E. Baird).
- 2) The computer processing of past plankton standing stock data and associated data on other parameters, e.g. temperature, salinity, mixed layer depth, phosphate, nitrate, etc. (J.H. Steele, J.A. Adams and J.H.A. Martin).
- 3) The routine monitoring of the area off the Scottish east coast for the occurrence of toxic dinoflagellates (D.D. Seaton).
- 4) The investigation of mass mortalities of sandeels in Scottish waters (J.A. Adams and others).
- 5) A review of the occurrence in the North Sea and adjacent sea area of dinoflagellates which have been associated with mass mortalities of marine organisms and/or which have been shown to be capable of toxin production (D.D. Seaton).
- 6) The plankton of the Firth of Clyde, of the Eden Estuary (in Fife) and of Loch Eil and Loch Linnhe with particular reference to coastal pollution studies (J.A. Adams, D.D. Seaton and N.T. Nicoll).
- 7) Primary and heterotrophic production studies in Loch Ewe (A.L.S. Munro, J.M. Davies, I.E. Baird and G.R. Williams).
- 8) The zooplankton of Loch Ewe (N.T. Nicoll).
- 9) Feeding and respiration rates of copepods from Loch Ewe in relation to a number of variables - e.g. food concentration, temperature, pollutants (R.W. Foster and D.D. Seaton).
- 10) The distribution and abundance of scyphomedusae in the northern North Sea (J.A. Adams).
- 11) A comparison of the stomach contents of young gadoids with the zooplankton in the area of their capture (J.A. Adams and J.R.G. Hislop).
- 12) The euphausiids as first intermediate hosts of the nematode Anisakis (J.W. Smith).
- 13) The food of larval fish (C. Yannopoulos).
- 14) Surveys of fish eggs and larvae in the Moray Firth (D.W. Armstrong), and in the west coast sea lochs (G.C. McKay).

- 15) Sampling on the Ballantrae Bank and off south Arran to measure production of recently hatched herring larvae in the spring (A. Saville and D. McKay).
- 16) Sampling of herring larvae during the autumn in the northwestern North Sea as part of the international survey of herring larval production in all major North Sea spawning areas (A. Saville and D. McKay).
- 17) Studies of the concentration of heavy metals and other pollutants in zooplankton (G. Topping).

Programme for 1972

The programme will cover a wide spectrum of investigations. However, the main aspects will be (i) routine collection of chlorophyll a and dry weight data as a measure of phytoplankton and zooplankton standing stocks respectively, (ii) routine monitoring for the presence of toxic dinoflagellates in coastal waters (iii) detailed descriptive work in certain areas or at certain times, e.g. the Firth of Clyde, throughout the year and the northern North Sea during July and August. (iv) more extensive experimental work, particularly in relation to the effects of sub-lethal concentrations of pollutants on zooplankton (v) monitoring the concentrations of heavy metals and other pollutants in zooplankton (vi) studies of fish eggs and larval fish in the Moray Firth and Clyde in the spring (in particular plaice and herring) and in the North Sea and off the west coast in the autumn (herring).

Oceanographic Laboratory, Edinburgh

The survey by the continuous Plankton Recorder was continued on the same basis as in previous years. During 1971, Recorders were towed for 130 850 miles by 35 ships of eight nations. The standard routes sampled by the Recorders towed at a depth of ten metres at monthly intervals are shown in Figure 1 (G.A. Robinson and others).

Studies of the planktonic environment of the herring fisheries off the north-east coast of Scotland and the Minch were continued in 1971. Samples have been taken regularly during the fishing seasons by the fishermen and by the crews of ferries belonging to the MacBrayne fleet (V. Bainbridge and others).

Dunstaffnage Marine Research Laboratory

A study of phytoplankton standing crop and primary production based on monthly sampling at two stations in Loch Etive and occasional samples in Loch Creran. The primary production study consisted of in situ C^{14} uptake measurements at a number of depths (P. Tett and B. Wood).

The above programme will continue with sampling at fortnightly intervals at two stations in Loch Creran and two in Loch Etive, while in addition a detailed study of the dynamics of the spring phytoplankton increase in Loch Creran, based on daily sampling over a restricted period, will also be undertaken.

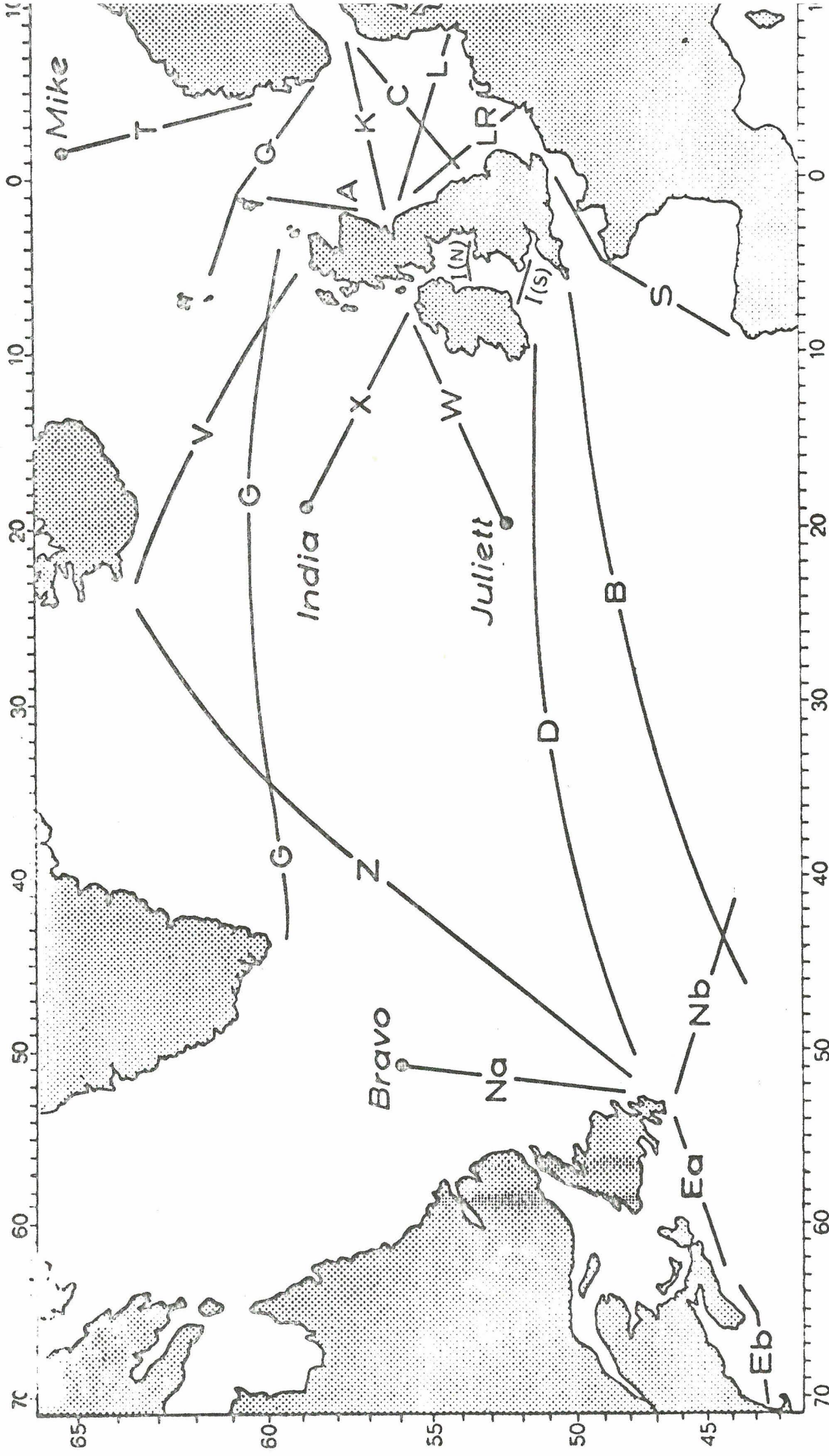


Figure 1.

U.S.S.R.

(A.F. Karpevich)

In 1971 data on phyto- and zooplankton were collected in the Norwegian Sea, 1) in April-May in the Norwegian Shelf area for determining the food base for herring larvae, 2) during the June oceanographic survey all over the area of the sea, 3) in July-August on standard latitudinal sections for determining the production of the main species of zooplankton that serve as food for pelagic fish.

In the Barents Sea plankton was collected on the drift routes of commercial fish larvae from the Lofoten spawning grounds with the aim of studying the influence of food base on larval survival. Observations were made on distribution and abundance of Euphausiacea.

Data collected are presented in the following Table

Area of sampling	Type of samples	Month	Number of samples
Norwegian Sea	zooplankton	Apr.-Aug.	1 034
Norwegian Sea	phytoplankton	June	170
Barents Sea	zooplankton	Apr.-Aug.	1 100
Barents Sea	Euphausiidae	Jan.-Feb.	134
		Sept.-Nov.	
Barents Sea	phytoplankton	Apr.-Oct.	415

Primary production

Studies on the seasonal and spatial dynamics of photosynthesis and phytoplankton composition were made in the Parnu Bay (Gulf of Riga). The effect of temperature, biogens, oxygen, vertical mixing of water and light on the primary production was investigated in an experimental apparatus. At the same time investigations were carried out under natural conditions.

Zooplankton

The abundance, distribution and composition of zooplankton were investigated in the Baltic, Gulf of Riga and Gulf of Finland to assess the condition of food reserves for plankton eating fish. The following problems were investigated: The seasonal long-term population dynamics and the distribution of some species depending on factors of the environment. Grazing of zooplankton by Baltic herring. The effect of sea pollution on composition and abundance of zooplankton in some areas of the Gulf of Riga. The connections between the primary production and zooplankton (the Parnu Bay).

Results : 1971 is considered a productive year because of the phytoplankton yield. This is confirmed by estimation of the abundance of zooplankton in the Baltic and in the Gulf of Riga: 125% of the mean value for many years. There was food for fish in the sea, the Gulf and its bay, at all seasons of the year. Methods for forecasting seasonal changes of abundance and for correlating some zooplankton development stages in the Gulf of Riga were worked out.

In 1972 investigations will be continued in accordance with the same programme.

In 1971 the paper by T.K. Sysoeva "Survival of Larvae of the Barents Sea Cod in Connection with Feeding Conditions and Water Temperature" was presented to the 59th Statutory Meeting of ICES, and the paper by A.F. Timokhina "Peculiarities in the Development of Plankton in the Norwegian Sea in Spring and Summer 1970" has been printed in Annales Biologiques, volume 27, page 63.
