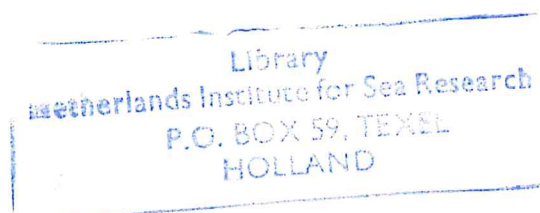


This paper is not to be cited without prior
reference to the author.

Annual Report
of the
Netherlands Institute for Sea Research
1971



Contents:

A. Scientific part

Introduction	1
Oecology and Migration.	2
Production and food-chain research.	8
Experimental biology	15
Marine Pollution.	21
Marine Geology and Geochemistry.	22
Chemical Oceanography	26
 Netherlands Journal of Sea Research	 30
Publications in 1971	31
Internal reports in 1971	35
Lectures by members of the staff	36
Colloquia and lectures in the Institute	38
Courses in the Institute	41
Visitors from abroad	42
Congresses attended by staff members	43
Institutes abroad visited by staff members	45

B. General part

Staff news	46
Domestic affairs.	48

A. SCIENTIFIC PART

Introduction

In the course of the year 1971 the guest-house and the new aquarium were finished in June and September, respectively. The sea-going research vessel, which was launched in September and named "Aurelia", neared completion at the end of the year. The new guest-house was immediately occupied and turned out to serve its purpose very well. In the aquarium the water circulation was tested and a beginning was made with the experimental set-ups. It will be put into full use in the course of 1972. This will mean the end to a period during which many projects, depending on a reliable seawater supply, had to be postponed, in spite of provisional constructions.

Just as in 1970 there was a considerable increase in staff, for the greater part due to the crew which had to be recruited for the "Aurelia".

In the course of the year the lack of space in the Provisorium became urgent, partly because the scientific research expanded to such an extent, involving the acquisition of more apparatus, that the laboratories became too crowded. Moreover, the group "Marine Pollution" started work and needed the necessary space for apparatus. The problem was solved by offering provisional accommodation in the new experiment aquarium to some departments, especially Ecology/Migration and Food-chain/Production. Plans for the future main building were discussed with the building coordinator Ir C.A. DOETS. The increased scientific activity as well as the occupation of those new buildings meant again that much extra work was asked of the auxiliary departments.

Oecology and Migration

At the appointment of the biological director, Mr J.J. ZIJLSTRA, on April 1st, it was decided that, concerning his research, he would join the working-group "Oecology".

Since the departments "Oecology" and "Migration" are still of a limited extent they are - for the time being - treated as a single working-group. The scope of investigations is rather divergent, though a general trend is materializing. The research program may be described as follows:

1. Field research into the distribution (CREUTZBERG, FONDS, Miss V.D. BAAN), fluctuations in number (ZIJLSTRA, KUIPERS, BOER), and migration patterns (CREUTZBERG, KUIPERS) of marine organisms, especially fishes and crustaceans.
2. Experimental research on the mechanisms, controlling distribution (FONDS), fluctuations in number (ZIJLSTRA) and migration patterns (CREUTZBERG, KUIPERS).
3. Detailed morphological research into specific functions in marine organisms such as feeding mechanisms in Lamellibranchia (DRAL) and functional anatomy of the eye in marine mammals (DRAL).

F. CREUTZBERG spent considerable time on the data collected in fishing-trips during the years 1961-1964 by FONDS and CREUTZBERG aboard the ships "Max Weber" and "Ephyra" on the Wadden Sea. These data had already been plotted in tables and diagrams by Mr FONDS and Miss G. BOERMAN. It is tried to summarize these very

voluminous data in a more amenable form, in order to describe the migration movements of various species of fishes.

Together with M. FONDS he organized a fishing voyage in the southern North Sea with the "Willem Beukelsz" as an experiment for the future research into distribution and migration patterns of fishes and crustaceans. The results of this trip were very encouraging and justify the continuation of this research in the southern North Sea with the research-vessel "Aurelia".

Finally some attention was paid to the development of the experimental migration- and orientation research, which, however, cannot be started before the experiment aquarium is put into full operation. In all these activities Dr CREUTZBERG was assisted by Miss L. ZUURHOUT.

Miss S.M. VAN DER BAAW proceeded with the review of the macroplankton data from the "Texel"lightship. The manuscripts on Cumacea and Decapoda and decapod larvae are finished (see 1970). To the latter manuscript some recent findings have been added. They will appear in the "Mededelingen" from the State Museum of Natural History, Leiden. The manuscript on shrimp migration is retained, pending future laboratory experiments. Presently the data on Hydromedusae are in preparation. The work on decapod data led to an investigation into the nature of the remains washed up on the beach in the course of the year. To this end three (later on four) sections of the coastline were searched at low tide, viz. the beach north of Scheveningen, the section

Wijk aan Zee-IJmuiden, the section Egmond aan Zee-Bergen aan Zee and later on also Petten-St. Maartenszee. A provisional "strandline-calendar" is practically finished. Miss G. BOERMAN and Mr P. BOER assisted in this research.

P. BOER continued working up the data collected by the department for acquisition of fishes from the local fishermen at Den Helder (dept. Material for Study). In 1971 he paid special attention to the data collected on cuttle-fish.

Moreover he continued his work on the data collected by Mr BEUMKES. In the last months of 1971 he was advised by Mr J.J. ZIJLSTRA and B. KUIPERS on questions of statistical tests.

From May on Mr BOER spent part of his time assisting the under-manned department of Material for Study at Den Helder.

J.J. ZIJLSTRA, besides his exacting task as a biological director of the NIOZ also explored the possibilities for organizing a research on density-dependent regulation of numbers of young plaice in the Wadden Sea. This regulation of the year-classes of plaice is probably to be found in their first year. In England (Lowestoft) a similar research is carried out, concerning the planktonic larval stages in the open sea. There are strong indications that even more important density-dependent regulations of numbers take place in the "nursery-areas" (STEEL & EDWARDS, 1970).

The main problem is to find a reliable method of

sampling young plaice in the Wadden Sea. Therefore the research was concentrated on developing and testing simple beam-trawls. A series of observations with an 1 metre beam-trawl at two fixed stations near the Institute from August to and including December yielded considerable fluctuations in the catches of plaice. These fluctuations may very well be due to migratory movements and hydrographical influences. Separate catches on the same day were very similar. Mr ZIJLSTRA was assisted by Miss G. BOERMAN, Mr R. DAPPER and Mr B. KUIPERS.

B. KUIPERS started on the 15th of September with a research on the oecology of young flatfish. Both qualitatively and quantitatively very little is known about the migration of young flatfish towards and from the emerging sand-bars in the Wadden Sea in connection with tidal currents. Since the young flatfish, especially the plaice, may play an important role as a predator on the bottom fauna of the shoals an analysis of these tidal migrations is of primary importance and the first subject to be studied. Together with Mr ZIJLSTRA he made a special study of the sampling technique for young flatfish populations.

M. FONDS worked on two subjects.

1. Influence of temperature on the respiratory scope for activity of gobies. To this end measurements on respiration of the fish at rest and during activity

were carried out from January to April at different temperatures with the following species: Pomatoschistus minutus, P. lozanoi, P. pictus and P. microps. The difference in oxygen uptake at rest and at maximum activity of the different goby species, was calculated in relation to temperature, in order to estimate optimum and limiting temperature conditions for activity.

2. Combined influence of temperature and salinity on embryonic development, growth and meristic characteristics in the garfish (Belone belone). This research was started in April. It was carried out in co-operation with Dr ROSENTHAL (Biologische Anstalt Helgoland) and Dr ALDERDICE (Nanaimo Station, Canada). Dr ROSENTHAL stayed in the NIOZ for some months and Dr ALDERDICE assisted in the set-up of the experimental scheme for one week, in connection with future statistic computations. From October to December the vertebrae and fin-rays were counted of hundreds of fixated young garfishes from the experiments. Mr FONDS was assisted in his research by Miss G. BOERMAN and Mr R. DAPPER.

A.D.G. DRAL's main subject in 1971 was the research on functional anatomy of the eye of marine mammals.

The first manuscript on the anatomy of the eye of the Bottle-nosed Dolphin is practically finished. Because of criticisms by persons interested, and because new material (three pairs of eyes) became available, the manuscript is now being revised and extended.

An anatomic description was started concerning

the eye of the Ganges dolphin, kindly sent by Professor Nishiwaki from Japan. The slides were prepared in the Ophthalmological Laboratory at Leiden. The interesting fact in this research is that the Ganges dolphin lives in opaque mud rivers and that the eye is greatly reduced.

In cooperation with Mr L. BEUMER from the Ophthalmological Laboratory at Leiden and Dr C.J.W. V.D. HURK, veterinary surgeon, a paper on a process of eye disease in a Baikal seal was completed.

Attention was also paid to the feeding mechanisms of Lamellibranchia. During the last months of 1971 a research was started, together with Drs W. SMIT, Zoological Laboratory of the University of Amsterdam, on the anatomy at submicroscopical level of the latero-frontal cilia of the mussel-gill.

Another paper in preparation concerns a certain aspect of the feeding mechanism of the mussel, viz. the function of the intrafilamental muscle cells.

Production and food-chain research

The aim of the research of this working group is to arrive at a quantitative description of the main food-chains in the Wadden Sea and adjoining parts of the North Sea. At present measurements are carried out concerning the primary production of bottom diatoms in the Wadden Sea (CADÉE) and phytoplankton in the Wadden Sea (CADÉE) and the North Sea (GIESKES), the secondary production and population dynamics of bottom animals (BEUKEMA: fieldwork mainly on bivalves, KLEIN BRETELER: shore crabs, DE WILDE: metabolism) and birds (SWENNEN).

In the course of 1971 a sixth scientist, W.C.M. KLEIN BRETELER joined the group. On 1-7-1971 he was appointed as a postgraduate assistant on a contract till 1-1-1972 pending a decision - which turned out to be in favour - on an application for a grant in aid of his research to the Netherlands Organization of ZWO, by the working group "Dynamics and Genetics of Populations" of BION.

Primary production:

G.C. CADÉE continued his measurements of primary production on and over emerging tidal flats in the western Wadden Sea. Since this year the first liquid scintillation counter became available, the counting apparatus is no longer the bottleneck of this research and the number of stations could be increased, measurements being carried out in situ at various locations simultaneously. This yields some indication for special variability in primary production in practically the same conditions of light and temperature.

Measurements of standing crop and vertical distribution of chlorophyll-a in the Wadden Sea bottom were continued. It appeared that from the concentration of chlorophyll practically nothing can be predicted about the amount of primary production.

Together with TNO--Den Helder an investigation was started into the effect of heavy metals on primary production in situ of the microflora of the tidal flats.

CADÉE took again part in the CICAR-project on measuring primary production in the Caribbean area, this time also in spring-time. The seasonal difference turned out to be negligible.

K. CANTERS (student biology, Groningen) and A. OGGEL (student biology, Amsterdam, Free University) measured the excretion of organic compounds during primary production. They found that it is relatively small throughout the year, on average one percent of the primary production, so older primary production data hardly need any correction for excretion.

W.W.C. GIESKES continued his research on eutrophication, primary production and the planktonic ecosystem in the southern North Sea. Four trips of a week's duration were made, during which samples were taken for hydrographic, chemical and biological analysis. Primary production was measured at a number of stations, both in the eutrophic Dutch coastal waters and in the oligotrophic waters of the central southern North Sea. The numerous data have now

been worked up and a publication is all but finished.

An important conclusion of the work is that enrichment by nutrients does not necessarily lead to a higher primary production. Per square meter the amount of carbon embodied in organic compounds in spring and summer may be less in the highly eutrophic waters near the coast than in the open sea where the influence of the Rhine is less felt. Seasonal variation in primary production in eutrophic water was quite different from that in oligotrophic water, and characteristic phytoplankton populations were found for each type of water. Particle-size spectra of both living and non-living suspended particles in the sea have been obtained with a Coulter Counter model B. It appeared that diatoms were dominant in coastal waters, especially in summer, while farther off the coast small diatoms and flagellates were the main summer producers.

Secondary production:

J.J. BEUKEMA continued his measurements on density and growth of a number of bottom animals in the Balgzand area. Moreover samples were taken all over the Dutch Wadden Sea, up to and including the Dollard, to determine density and biomass of the bottom animals. With the aid of the data collected systematically on the Balgzand over four years it should be possible to arrive at a justified estimation of the production for various species.

Special attention was paid to distribution of Macoma balthica. There are more and more indications that local densities of this bivalve are chiefly

determined by migration during the second half of its first year.

Research into the efficiency of the van Veen grab as compared to the Reineck Kastengreifer was continued and finished.

Determinations of biomass and distribution of species in the bottom fauna in the near North Sea were carried out off the main part of the Dutch coast. Compared with former observations by EISMA there are considerable fluctuations in numbers of many species. The pattern of distribution appears to be much less variable.

A census of Dutch marine biological research, carried out on the request of the Netherlands Committee for Sea Research of the Royal Academy of Sciences is now finished.

A. VAN KUYEN (student biology, Leiden) wound up his research on the relation between daily growth of cockles and available food.

J. DE VLAS (student biology, Groningen) continued a research, started by BRINKS (student biology, Leiden) into the migration of juvenile Macoma balthica and found besides new details on transport by tidal currents, some indications for settlement in the North Sea by young Macoma's from the Wadden Sea.

M. BASAL (guest-worker from Syria) carried out a three months' research on differences in morphological characteristics and in condition (weight of flesh) in mussels

collected at different heights in the tidal zone.

W.C.M. KLEIN BRETELER continued his research, started in 1970 as a student's subject, on numbers, growth and production of the shore crab Carcinus maenas (L.). Along twelve transects on the Balgzand area numbers and sizes of juvenile crabs were noted down, both at the beginning and at the end of the season. The production calculated from ash-free dry weights appeared to be lower than in preceding years.

At two sampling stations and in the laboratory a detailed study was made of the growth of young shore crabs. Size increment changed in the course of the season, which in the laboratory study could be better explained by environmental factors than by e.g. a genetic variation.

P.A.W.J. DE WILDE continued his measurements on oxygen consumption of Macoma balthica at different temperatures. Besides working with animals kept in the laboratory he made a duplicate series with so-called "wild" Macoma's animals recently collected on the tidal flats. The oxygen consumption of the latter turned out to be slightly lower. Special attention was paid to animals kept at 0°C. Though here the feeding frequency was 2 to 3 times lower than at 10 °C the animals maintained a remarkably high activity at these low temperatures. It was obvious that they still grew, which puts an end to the hypothesis of a direct influence of low temperatures on the growth of Macoma.

In autumn the removal to the experiment aquarium took place and new experimental set-ups were constructed.

The combination of more space and a fourfold increase of measuring apparatus will considerably speed up the time-consuming measurements. Apparatus for measuring O_2 consumption in intact Wadden-cores and a set-up with artificial ebb- and flood conditions are being made. The behaviour of the experimental animal Macoma was laid down in a 16 mm film of 20 minutes duration, which also demonstrates the type of research.

C. SWENNEN continued the population research of the eider duck on the island of Vlieland. Thanks to the installation of cannon-nets it was now for the first time possible to ring drakes during the breeding period. A serious handicap in this research is that the rings wear out so soon. Now that mortality due to chlorinated hydrocarbons in the Wadden Sea is over the expectation of life of the eiders far surpasses that of the rings.

By using the cannon-net the following birds could be ringed: 252 eiderducks, 200 gulls (mainly black-headed gulls) and 1300 waders (mainly oystercatchers).

The food experiments with black-headed gulls were continued. The hand-reared animals were now sexually mature for the first time, showing their good condition by nesting and the hatching of a number of young birds.

Much time was spent in a further compilation of bird counts carried out from 1964 to 1970 from ships in the western Wadden Sea.

J.A. KRIJGSMAN (student biology, Leiden) finished his research on the smelt (Osmerus eperlanus) in the

Wadden Sea.

C.J.M. DIETVORST (student biology, Nijmegen) investigated the occurrence of trematods in some gastropods in the western Wadden area.

P.H. VEREIJKEN (student biology, Nijmegen) studied the ecology of the metacercary of the trematod Meiogymnophallus minutus.

A.P.H. MULLER (student biology, Utrecht) finished his research on the food of the spoonbill on the island of Texel. This research was carried out in the NIOZ in cooperation with the R.I.N.

H.J.L. HEESSEN (student biology, Utrecht) started a research on the taxonomy and ecology of some closely related Cotylurus species (trematods).

Experimental biology

In 1971 further research was carried out concerning the mechanisms which control certain typical life processes of marine organisms and their adaptations to the prevailing environmental conditions. In the sub-group Comparative Physiology R.E. WEBER and the postgraduate assistant J.H. EVERAARTS investigated some functional aspects of respiratory pigments, while D.H. SPAARGAREN and R.E. WEBER continued the research on water and salt economy of marine evertebrates. In the sub-group Marine Microbiology processes of oxydation and reduction of sulphides by bacteria from the tidal flats were investigated by J.H. VOSJAN and the postgraduate assistant Mrs A. TIMMER-TEN HOOR. Due to a traffic accident the latter was unable to work from May to December 1971.

A. Research on blood pigments.

R.E. WEBER studied the influence of prolonged temperature acclimatization on oxygenation of Arenicola haemoglobins. Prolonged high temperatures increase the affinity for oxygen, as measured at a given temperature. The influence of temperature on this affinity, however, does not change.

The muscular haemoglobin (Mb) of Arenicola was isolated and functional and molecular properties determined. The oxygenation suggests a linked function between blood haemoglobins and cellular oxidation systems, as in vertebrates. By electrophoresis two components could be distinguished, which could be isolated separately by iso-electric-focusing

techniques, to be used in function analysis. MbI and MbII appeared to have different oxygen affinities, which suggests a mutual transfer of O_2 . The sensitivity for temperature proved to be extremely low, just as had been found for haemoglobin (adaptations to considerable fluctuation of temperature in Wadden Sea) and also different for the two components.

In co-operation with scientists from the Scripps Institute (California, U.S.A.) and the Zoophysiological Laboratory of Aarhus, Denmark, a similar research was started on myoglobins of three antarctic penguins.

The comparative data on worms from Naples were completely worked up and prepared for publication. They were collected during a stay in 1970. Moreover a research was started concerning the part played by organic phosphates (ATP and DPG) in the adaptation of oxygenation properties of Hb of fishes to environmental conditions.

J.H. EVERAARTS in March finished his graduation research on Arenicola Hb and entered service on the 1th of April as a postgraduate assistant. He started an investigation into Hb-heterogeneity in herring and other clupeids, especially as to its functional aspects within the individual and the ontogenetic development. The Hb components were separated by means of a miniature electro-focusing technique. It appeared that for all sizes of herring and sprat 3 main components are present. By means of the Hb proteins and their iso-electric points the species could be distinguished and the greater part of the ontogenetic development followed.

To improve this miniature method an apparatus was constructed (flow-through cuvette) for eluation of the micro-columns, so that a direct registration of pH and optical density and their relation could be obtained.

The components of mixed samples of herring blood were separated by means of preparative electro-focusing and fractionated for function analysis.

H. DE WILDE (student biology, Utrecht) started in June with a research on the aspects of functional and molecular differentiation of the haemoglobins of flounder and plaice. The oxygen-affinity and the pH-sensitivity (Bohr effect) of Hb in blood corpuscles of flounder were determined. The Hb is half saturated at 7 mm pO_2 at the physiological pH (7.5). Washing the blood corpuscles in isometric NaCl does not influence the oxygen affinity. It increases greatly at haemolysis. At least 10 Hb components could be separated by electro-focusing technique. It will be tried to establish possible differences in oxygenation in the main components.

B. Osmoregulation research.

D.H. SPAARGAREN investigated the mechanisms of osmoregulation in shrimps. Besides data on oxygen consumption it was tried to obtain some data on energy consumption during osmoregulation by studying the influence of temperature and salinity on heart-rate. By means of impedance measurements a new method for taking cardiograms in aquatic evertebrates was developed. A strong increase in heart-rate at extreme salinities could be demonstrated; the heart-rate

is lowest near the isosmotic salinity.

In Naples at the "Stazione Zoologica" a comparative research was carried out on osmoregulation of shrimps, which in the Bay of Naples are exposed to combinations of high temperatures and high salinities which would be lethal to northern species. In their blood as well as in the tissues a different ability to excrete electrolytes was found.

Studies of chloride regulation and blood volume furnished the theme for two papers, to be published next year. It appeared a.o. that the cations play an important role in liberating non-electrolytes for the isosmotic cellular regulation.

F. ENGELSMA (student biology, Groningen) started a research on osmoregulation of the shore crab.

R.E. WEBER continued his research on the contribution of amino acids to cellular osmoregulation in Crangon crangon. It appeared that those amino acids form a sensitive intracellular balance for the variations in blood osmolarity induced by the environment, especially alanine, glycine and proline. Change in salinity of the medium involves exchange of cellular and blood concentrations of nitrogenous matter.

Other investigations concerned the influence of disturbance of the natural ion balance - e.g. by discharge of industrial salts into the sea - on ion regulation and survival of the shrimp. It appeared that tolerance for

increased K^+ content was extremely low, always in connection with a breakdown of the K^+ regulation. At equal concentrations of K^+ the consequences are more fatal at estuarine salinities than in the ocean. A short period of K^+ deficiency is less harmful. It is accompanied by an increase of amino acids in the cells (compensation-mechanism?).

Moreover studies of the regulation in blood and cells of Na^+ , Ca^{++} and Mg^{++} were continued.

M. BAARS (student biology, Groningen) studied water and salt economy of the worm Nereis virens. The water contents of the tissues varies with the salinity of the medium, while the intracellular ninhydrinpositive matter - a.o. amino acids - remains more or less constant, contrary to the situation in the common shrimp, where it is involved in adaptation of cellular osmo-concentrations. The contribution of Cl^- and of the main cations to the concentration on blood and cells was also determined.

Miss L. VAN DEYL (student biology, Utrecht) investigated the regulation of osmotic concentrations in blood and tissues of the velvet swimming crab Macropipus puber. In spite of its oceanic distribution and the fact that blood and medium are isosmotic, it appeared that the animal could stand dilutions down to 16⁰/oo S. A good volume regulation of the cells was found, in which, besides amino acids, electrolytes were involved, which indicates an extraordinary tolerance of tissue protoplasm for electrolytes.

C. Marine Microbiology.

J.H. VOSJAN studied the effect of copper and mercury on the growth of Desulfovibrio in a continuous culture. It appeared that in such a culture the metals are continually being rendered harmless by formation of sulphides. The results have been published.

The data on sulphate/chlorinity relation in the Wadden Sea, collected during 10 trips in 1970 and 1971, have also been worked out. For the Wadden Sea they yielded the following equation:

$$\text{SO}_4 \text{ g/kg} = 0.1349 \text{ Cl } ^\circ/\text{oo} + 0.0462.$$

In the sediment the relation varies considerably, due to the influence of bacteria.

After a Ribi-cell fractionator had been acquired it was possible to obtain cell-free extracts from Desulfovibrio and the research on the energy metabolism of Desulfovibrio could be continued.

H.J. GONS (student biology, G.U., Amsterdam) did research on fermentation and respiration of Desulfovibrio in continuous cultures.

Mrs A. TIMMER-TEN HOOR continued the experiments on selection by substrate concentration in 1971. It was now very apparent that at a different concentration (of H_2S) in the substrate a different population becomes dominant. There were, however, still difficulties with the isolation of these separate populations. The strains that had already been isolated did not survive in her absence from June to and including December.

Marine Pollution

J.C. DUINKER was engaged on formulating a research programme for the next few years, planning and acquiring the necessary apparatus and supervizing its construction in 1971.

Together with R.F. NOLTING (in service since May 1st, 1971) three trips on the Wadden Sea were made in the "Eider", to obtain samples of sea water, suspension and sediment. From those samples a number of metals have been determined quantitatively. The part played by some phases in collecting and storing the samples in relation to the contamination of those samples by contact with metals is now being investigated (watersamplers, filters, storage-vessels and storage technique).

The department had at its disposal an atomabsorption spectrometer, Perkin-Elmer 403 (since August), a flameless excitation source for this apparatus (HGA-70) (since December), a gas chromatograph Mikrotec 220 with a flame ionisation detector and an electron-capture detector.

W.F. TEN BERGE entered service at December 1st. During December he acquainted himself with the literature on trace analysis of chlorinated hydrocarbons and metals in sea water, silt and marine organisms. Moreover he mastered the operation of the analytical apparatuses mentioned above. Some samples were investigated for organic material with the gas chromatograph.

Marine Geology and Geochemistry

D. EISMA, besides his work as a leader of this group, spent the month of April taking part in a CICAR expedition on board HMS "Luyms" over the shelf of Surinam and Guyana, together with E.C. TJOE-AWIE, to collect samples of bottom- and suspended material. Much time was devoted to the acquisition of a penetrating echo-sounder, which was tried out from 5 to 9 July on board the Willem Beukelszoon, mainly around Devils Hole (north of Dogger Bank) and which yielded very **satisfactory** results. The text of a paper on North Sea sediments, read at the North Sea Science Conference at Aviemore, Scotland, was prepared for publication. In the mean time the research on shells, collected from 1965 to 1970 in the southern North Sea, was continued; part of the material (old Cardium shells) were sent to W. MOOK (Physical Laboratory, Groningen) for isotope analyses. The grainsize data are still being worked out at the Mathematic Centre, Groningen. S.J. VAN DER GAAST determined the mineralogical composition of samples collected by A.J. VAN BENNEKOM, F. JANSSEN and R. MISDORP (North Sea area) and E.C. TJOE-AWIE (north coast of South America) and continued his work on identification of feldspars (contents and type) in sediments.

H. AALDERS (student Geosciences, Free University, Amsterdam) worked out the results of research on structures in sand samples from the Southern Bight, obtained by box-sampling.

R. MISDORP (student Geography, Amsterdam) worked out the results concerning the possibility of using trace-elements in the silt-fraction as tracers.

J. DE KROON (student Geosciences, Free University, Amsterdam) worked out grain-size data from the Southern Bight.

A.J. VAN BENNEKOM devoted much of his time to checking the technique for chemical analysis of silicon, both dissolved and in suspension, as previous results had often been highly unsatisfactory. As to dissolved Si only a better insight was gained into the limitations of the method used, however, it is usable with an accuracy of 5%. For suspended Si the method was considerably improved, but so far it could only be applied in a limited number of cases. It has again been proved that X-ray diffraction, carried out by S.J. VAN DER GAAST, was essential to the interpretation of results. That part of the research on the silica balance in the North Sea which concerns the dissolved silicon will be wound up first. Development of the counting apparatus for Si-32 was postponed, the technical problems being more difficult than expected.

Together with S.B. TIJSSEN and K. VAN DER VEEN (Royal Met. Inst.) he worked out the data obtained during the CICAR expeditions 1970 and 1971 on water circulation and chemistry of nutrients on the shelf off Surinam and French Guyana. The distribution of fresh water from the Amazon is clearly influenced by the wind. As the measurements were very variable and sometimes incomplete due to lack of time it is difficult to arrive at a good quantitative

description. From all the nutrients dissolved silica gives the clearest picture. On the one hand a considerable amount of Si, from the Amazon waters fanning out into the ocean, is laid down in plankton, in spite of the low amounts of phosphates and nitrates. On the other hand in the silt zone close to the coast silica is dissolved locally, together with a decrease of oxygen in the water, which probably points to a biogene origin of this Si. A local upwelling may be responsible for the supply.

J.H.F. JANSEN analyzed the samples collected during the previous year. Together with S.J. VAN DER GAAST experiments on quantitative mineralogical analyses by X-ray diffraction were carried out. From 5 to 9 July a trip was made, together with a.o. D. EISMA, on board of the Willem Beukelszoon, to test out new apparatus, e.g. a Raytheon echo-sounder.

From August 6th to September 8th the coaster HADO was chartered for a trip to the northern North Sea. It appeared that the gravity corer could not be used from this ship, but many profiles were obtained with the echo-sounder. The remaining time was mainly spent in studying these profiles.

T.J. VAN WEERING (student Geology, Amsterdam) made and worked out echo-sounding profiles of the Northern Trough, if possible with additional bottom samples.

E.C. TJOE-AWIE took again part in the CICAR-programme, which was carried out in two parts. From April 14th to April 26th the coastal waters off French-Guyana were sampled from HMS "Luymes"; the mouth of the Amazon was visited with the "Almirante Saldanha" between May 24th and June 2nd.

During both trips bottom samples were taken with a van Veen-grab. First of all the samples were used for determination of grainsize, frequency distribution, CaCO_3 content, CIN quotient, bulk density and sedimentation volume. At a later stage special attention will be paid to clay mineralogy. At a number of stations near the coast the suspended matter was also sampled, to be used for determination of concentration and grainsize distribution.

The research of the suspended matter is completely finished and dealt with in a paper read at one of our colloquia. A beginning was made with the analysis of the samples collected in 1970 and 1971: in 50 samples moisture content, CaCO_3 percentage, bulk density and grainsize distribution were determined.

Chemical Oceanography

This year again a considerable amount of material and personal effort was spent on the combined programme of the NIOZ and the ~~Roy. Neth.~~ Meteorological Institute, which was carried out in the spring as part of the CICAR project. W. HELDER and J.J.A. VAN WEERELD took part in this research in the Equatorial Atlantic off Surinam and French Guyana. In October J.J.A. VAN WEERELD was transferred to the Instruments Dept. where for the time being he took over the management of the Electronic department. The resulting vacancy had not yet been fulfilled at the end of the year.

H. POSTMA, assisted by J.W. ROMMETS, M.W. MANUELS and students continued the research of the Wadden Sea. Eleven trips were made from Den Helder to the Ems, including 65 stations for determinations of salinity, temperature, phosphorus (by the student V. DE JONGE, University of Nijmegen), fluorescence in UV light and the adenosine triphosphate content of the organic matter.

In the summer months a distinct increase in salinity by evaporation was found at the tidal watersheds. The total phosphorus content of the Wadden Sea water is considerably higher than in the years 1949 to 1952, due to the increasing discharge of phosphate into Dutch coastal waters. The fluorescence measurements were used to give some idea of mixing of the waters in the various compartments of the Wadden Sea and in the Eems-Dollard area. The ATP determinations reflect the relation between living and dead organic matter.

V. ARENAS FUENTES (visiting scientist from the University of Mexico) finished his research, started in 1970, on the influence of DDT on the growth of some phytoplankton species.

S.B. TIJSSEN worked out (mainly together with VAN BENNEKOM) the physical and chemical data obtained during 1970 and the present year, concerning the CICAR research. On the one hand the data must be laid down in such a way that they can be used for the arranged international exchange of data, on the other hand they must be worked up for publication. A preliminary presentation took place on the CICAR colloquium held in November. The Data Processing Service of "Rijkswaterstaat" is being consulted about assistance at the construction of a system for automatic recording nautical, physical and chemical data on paper tape. This system is to be used on board the future North Sea research vessel.

Together with J.M. ROMMETS a course in Algol-60 was followed in the Mathematical Centre in Amsterdam.

W. HELDER continued his research, assisted by students, on components of the N-cyclus in the Wadden Sea. Monthly trips were made with the "Eider", together with colleagues working on other items. When compared with the results obtained by POSTMA ten years ago the

concentration level of N-components is clearly higher. The period from March 1st to May 8th was spent in the waters off the coast of Surinam and French Guyana (till April 8th on board H.M. "Luymes") to assist at the combined physical and chemical research by NIOZ and Royal Neth. Met. Inst., as part of the CICAR project. Assisted by J.J.A. VAN WEEERELD and M.W. MANUELS a research was carried out on the nitrogen cycle in the Surinam river following the research done by VAN BENNEKOM in 1969.

The results are still being worked out, but it may already be stated that the oxygen content in river and reservoir is much improved.

After extensive study of known automatic methods for chemical analysis and try-out of apparatus constructed in our own workshop it was decided to buy a 6-channels automatic analyzer from Technicon Instruments. To build a similar system in our own workshop would take too much time and instrumental research.

D. MEYERS (student biology, Free University, Amsterdam) and H. MURRIS (student biology, Free University, Amsterdam) gave assistance to the N-components research in the Wadden Sea in January and February.

J.T.F. ZIMMERMAN entered service as a post-graduate assistant on August 15th. Though a physical oceanographer he was assigned to our working group, pending the establishment of a separate group for Physical Oceanography. His subject will be water exchange between Wadden Sea

and North Sea. Prof. GROEN is to supervise this research. So far mainly research in the relevant literature has been carried out. A diffusion equation derived for a one-dimensional treatment of an estuary and applied to the results obtained by DORRESTEIN in the Ems-estuary yielded as a result that especially a so far unrecognized mechanism, probably connected with the retardation effects of the gulleys, plays a dominant part in the diffusion-coefficient, so that fluctuations in river discharge, causing fluctuations in the longitudinal salinity gradient only effect limited changes in the diffusion-coefficient.

Netherlands Journal of Sea Research

In 1971 2 issues were published: volume 5 nr. 2 (April) and vol. 5 nr. 3 (July), comprising 11 papers (269 pages) of which 4 (92 pages) from the NIOZ (one in collaboration with another author), 2 (38 pages) from the Delta Institute, 1 (76 pages) from the RIVO, 1 (8 pages) from the KNMI and 3 (55 pages) from abroad (Canada and U.S.A.). Two papers were also published as a doctor's thesis.

As to the subjects the following classification can be made: 2 papers (23 pages) on physical oceanography, 1 (76 pages) on morphological ecology, 5 (91 pages) on distribution ecology, 2 (71 pages) on physiology and 1 (8 pages) on methodology.

During 1971 20 manuscripts have been submitted for publication, to which must be added 13 manuscripts left over from 1970. Of these 33 manuscripts 11 have been published in 1971, 7 are to appear in the first issue of 1972, 3 have been accepted for future publication, 5 have been held over for further consideration, 2 have been withdrawn and 5 refused.

Publications in 1971

- BAAN, S.M. van der. Strandwandelingen. I. Aanspoelsel en strandprofiel. - Zeepaard 31 (4): 78-82.
- . Strandwandelingen. II. Strand verkennen. - Zeepaard 31 (5/6): 110-111.
- & L.B. HOLTHUIS. Seasonal occurrence of Mysidacea in the surface plankton of the southern North Sea near the "Texel" lightship. - Neth. J. Sea Res. 5 (2): 227-239.
- BEUKEMA, J.J. De werkgroep voedselketen- en productieonderzoek. - Meded. Hydrobiol. Ver. 5: 98.
- . Efficiëntietest van de van Veen-bodemhapper. - Meded. Hydrobiol. Ver. 5: 98-99.
- . Productivity of Macoma balthica (L.) on a tidal flat area near Den Helder (Netherlands). - Neth. J. Zool. 21: 213-214.
- . Angling experiments with carp (Cyprinus carpio L.). Proc. Fourth Br. Coarse Fish Conf.: 27-41.
- BOER, P. Historische vangst van een kleine slakdolf. - De Levende Natuur 74 (1): 22-24.
- . De andere harder. - De Levende Natuur 74: 62-65.
- . Het voorkomen van inktvissen langs de Nederlandse kust. - Zeepaard 31 (4): 65-77.
- CADÉE, G.C. Primary production on a tidal flat. - Neth. J. Zool. 21: 213.
- EISMA, D. & S.J. VAN DER GAAST. Determination of opal in marine sediments by X-ray diffraction. - Neth. J. Sea Res. 5 (3): 382-389.

- & H.W. VAN DER MAREL. Marine muds along the Guyana coast and their origin from the Amazon basin. - Contr. Mineral. and Petrol. 31: 321-334.
- & A.J. VAN BENNEKOM. Oceanographic observations on the eastern Surinam shelf. - Hydrographic Newsletter Special Publ. 6: 25-29.
- FONDS, M. The seasonal abundance and vertebral variation of Pomatoschistus minutus minutus and lozanoi (Gobiidae) in the Dutch Wadden Sea. - Vie et Milieu Suppl. 22: 393-408.
- GIESKES, W.W.C. Removal of "Podon" polyphemoides from the genus Podon. - Hydrobiologia 38 (1): 61-66.
- . Mogelijk verband tussen Seizoenssuccessie van twee Podon (Cladocera)-species en hun voedsel in de Noordzee. - Meded. Hydrobiol. Ver. 5 (2): 100-101.
- . The Succession of two Podon (Crustacea, Cladocera) Species in the North Sea. - Neth. J. Sea Res. 5 (3): 377-381.
- . Ecology of the Cladocera of the North Atlantic and the North Sea. - Neth. J. Sea Res. 5 (3): 342-376.
- HOOR, A. TEN. Isoleren van Thiobacillus. - Meded. Hydrobiol. Ver. 5 (2): 107-108.
- KRISTENSEN, I. Preference of euryhaline species for brackish and supersaline waters. - Vie et Milieu Suppl. 22: 811-826.
- POSTMA, H. Mogelijkheden van en grenzen aan het gebruik van zeeën en oceanen. - De Ingenieur 83 (7): 111-114.
- . Distribution of nutrients in the sea and the oceanic nutrient cycle. - Symposium Sao Paulo.
- SPAARGAREN, D.H. Aspects of the osmotic regulation in the shrimps Crangon crangon and Crangon allmanni. - Proefschrift Univ. van Amsterdam. - Neth. J. Sea Res. 5 (3): 275-333.
- . Over mechanismen en oecologische betekenis van de osmoregulatie van de garnalen Crangon crangon (L.) en Crangon allmanni Kin. - Meded. Hydrobiol. Ver. 5 (2): 108-109.
- . Verslag van de werkzaamheden van D.H. SPAARGAREN tijdens zijn verblijf aan het "Stazione Zoologica" te Napels in februari en maart 1971. - Verslagen

- van de Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Natuurkunde 80 (8): 130-133.
- SWENNEN, C. Het voedsel van de Groenpootruiter Tringa nebularia tijdens het verblijf in het Nederlandse Waddengebied. (Summary in English). - Limosa 44 (3/4): 71-83.
- . Een parasitaire besmetting als doodsoorzaak van Zilvermeeuwen. - Meded. Hydrobiol. Ver. 5 (2): 103-104.
- . Een Reuzenhaai Cetorhinus maximus als substraat voor de zeenaaktslak Tergipus despectus. - Het Zeepaard 31: 51-52.
- TIJJSSEN, S.B. Hydrographic and chemical observations in the Southern Bight, February, May, July and October, 1969. - Annales Biologiques XXVI (1969): 73-81.
- , L. OTTO & M.P. VISSER. Variations of the hydrographic situation in the Southern Bight of the North Sea, February-March 1969. - Annales Biologiques XXVI (1969): 71-73.
- VILELA, M.M. & J.J. ZIJLSTRA. On the condition of herring larvae in the central and southern North Sea. - Rapports et Proces-Verbaux des Réunions 160: 137-141.
- VOSJAN, J.H. Sulfidevorming. - Meded. Hydrobiol. Ver. 5 (2): 106.
- WEBER, R.E. Oxygenational properties of vascular and coelomic haemoglobins from Nephtys hombergii (Polychæta) and their functional significance. - Neth. J. Sea Res. 5 (2): 240-251.
- . On the excretion of glucose in the lobster Jasus lalandii (Crustacea, Decapoda). - Comp. Biochem. Physiol. 38 (2A): 465-467.
- . Over de inwerking van enkele milieufactoren op de functie van haemoglobine bij wadpieren. - Meded. Hydrobiol. Ver. 5 (2): 109-111.
- WILDE, P.A.W.J. DE. Invloed van de temperatuur op de groei van het nonnetje, Macoma balthica (L.). - Meded. Hydrobiol. Ver. 5 (2): 101-103.
- . Natuurbescherming in Ethiopië. - Nat. en Landsch. 1: 29-36.
- . Oostpunt. - Feestbundel 20 j. Natuurwetensch. Werkgr. Ned. Ant.: 42-49.
- ZIJLSTRA, J.J. The North Sea herring. (Being the report of the North Sea Working Group to the Herring Committee). - ICES Coop. Res. Rep., Ser. A, No. 26. (Anoniem 1971).
- ZIJLSTRA, J.J. & K.H. POSTUMA. On the recruitment of the Downs herring. - Rapports et Proces-Verbaux des Réunions 160:

158-160.

———. "Waddenzee-Kinderkamer". - Visserij 24 (2): 82-90.

———. Report on the International Surveys of Herring Larvae in the North Sea and Adjacent Waters in 1970/71. - ICES, CM 1971/H:15. Pelagic Fish (Northern Committee).

Internal reports in 1971

NB with the exception of 1971-13 all reports are in Dutch.

ANNUAL REPORT of the Netherlands Institute for Sea Research
1970 (Dutch version). Nr 1971-6.

ANNUAL REPORT of the Netherlands Institute for Sea Research
1970 (English version). Nr 1971-13.

EISMA, D. Introduction to oceanography. Nr 1971-7.

EVERAARTS, J.H. The influence of electrolytes on the functional and structural properties of haemoglobin from Arenicola marina L. Nr 1971-3.

KLEIN BRETELER, W.C.M. Growth and production of the shore crab Carcinus maenas (L.) during its first two years of life on the Balgzand. Nr 1971-2.

———. Vertical migration of Pleurobrachia pileus O.F. Müller (Ctenophora) in the North Sea. Nr 1971-9.

KROON, J.C. DE. Potential primary production in the eastern part of the Southern Bight. Nr 1971-1.

KRIJGSMAN, J.A. Research on smelt as a cause of concentrations of fishing gulls in the Wadden Sea, with systematic and population-dynamic data on the smelt (Osmerus eperlanus L.). Nr 1971-10.

MANUELS, M.W. & J.W. ROMMETS. Salt-, temperature- and suspension measurements in the Wadden Sea; April 1970 to and including Dec. 1971. Nr 1971-12.

POSTMA, H. The sea as a challenge. Nr 1971-5.

VATE, L. VAN DE. An irradiance meter, testing, theory and experiments. Nr 1971-8.

VOSJAN, J.H. & C.F. BEKE. Sulphate in water and sediment of the Wadden Sea. Nr 1971-11.

ZIMMERMAN, J.T.F. Some remarks on the behaviour of waves in the Wadden Sea. Nr 1971-4.

Lectures by members of the staff

- BENNEKOM, A.J. van: The silicon cycle in the Southern Bight of the North Sea. ICES, Hydrographic Committee, Helsinki, 28 September.
- BEUKEMA, J.J.: Secondary production in the Wadden Sea. Netherlands Oceanographers' Circle, 3 November.
- CADÉE, G.C.: Primary production on tidal flats. Netherlands Oceanographers' Circle, 3 November.
- CREUTZBERG, F.: Coral reefs as an object for nature conservation in the Netherlands Antilles, Volksuniversiteit Den Helder, 29 November.
- CREUTZBERG, F. & M. FONDS: Seasonal variation in distribution of demersal fish in an estuarine area: the Dutch Wadden Sea. E.M.B.S., Rovinj, Yugoslavia, 30 September.
- DUINKER, J.C.: What about the Wadden Sea? Lectures for municipal executives of the Frisian Islands, Texel, 7 April.
- . Chemical products in the sea. Amsterdam Debating Club of Chemical Students, 24 February.
- . The sea in danger, Contact Committee for Nature Conservation, The Hague, 27 November.
- EISMA, D.: Oceanography, IOS-course, Geological Institute, Utrecht, 23/25 March.
- . Sediment distribution in the North Sea in relation to marine pollution. North Sea Science Conference, Aviemore, Scotland, 16 November.
- FONDS, M.: Reproductive behaviour of sea gobies, Netherlands Zoological Society, Nijmegen, 10 September.
- . Seasonal migration of demersal fish in the Wadden Sea, with a film on reproductive behaviour of sea gobies. Utrecht Biologists' Society, Utrecht, 4 March.
- GIESKES, W.W.C.: Oecology of marine cladocera in the North-Atlantic and the North Sea, Netherlands Zoological Society, Nijmegen, 10 September.
- POSTMA, H.: The exploitation of seas and oceans: possibilities and limits. 4th centenary of the cement factory, IJmuiden, 24 May.
- . Organic matter in the North Sea. North Sea Science Conference, Aviemore, Scotland, 16 November.

SWENNEN, C.: Ornithological Research in the Wadden Sea.

Netherlands Oceanographers' Circle, 3 November.

———. The distribution of swimming-birds in the western Wadden Sea, Netherlands Ornithological Union, Utrecht, 3 December.

WEBER, R.E.: The free amino acid pool of the shrimp Crangon crangon and its osmoregulatory significance. Symposium of the Society of Experimental Biology, Göteborg, Sweden, 20 July.

———. O₂ transfer systems in respiratory pigments of the worms Arenicola and Nephtys. Physiological Circle of the Netherlands Zoological Society, NIOZ meeting, 21 May.

WILDE, P.A.W.J. DE: Influence of temperature on oxygen consumption and growth of Macoma balthica (L.). Physiological Circle of the Netherlands Zoological Society, 21 May.

ZIJLSTRA, J.J.: Wadden Sea-Nursery. Netherlands Oceanographers' Circle, 3 November.

Colloquia and lectures in the Institute

15 January:

- G.C. Cadée (NIOZ): Shell transport in the Wadden Sea.
J.H.F. Jansen (NIOZ): Distribution and origin of iron
in the North Sea sand off the Thames-estuary.

29 January:

- W.M.C. Klein Breteler (student University of Leiden):
Production of crabs in the Wadden Sea.
G. v.d. Veer (student University of Utrecht): Silicon
balance in the Wadden Sea.

12 February:

- G.J. Heerebout (State Museum of Natural History, Leiden):
Distribution and migration of North-Atlantic shrimps,
especially Crangon crangon and C. allmanni.
D. Boddeke (RIVO, IJmuiden): The sexual cycle in the shrimp.

26 February:

- D. Bisma (NIOZ): The determination of silicium in marine
sediments.
C.Ch. Brandt (Zoological Lab. University of Leiden): The
future of the scientist in a world with computers.

12 March:

- W.J. Wolff (Delta Institute, Yerseke): May brackish water
classifications be applied to estuaries?
P.H. Nienhuis (Delta Institute, Yerseke): Patterns and
processes in benthic algal vegetations.

26 March:

- J.J. Beukema (NIOZ): Tidal migration of shrimps.
C. Swennen (NIOZ): Catching birds for scientific research
by means of the cannon-net.
P.A.W.J. de Wilde (NIOZ): Oxygen consumption of Macoma.

9 April:

- J.H. Koeman (Institute for Vet.Pharm. and Tox., Utrecht): The toxicological significance of PCB's (polychlorinated biphenyls) in the environment.
- J.C. Duinker (NIOZ): Future plans of the working group Marine Pollution in the NIOZ.
- J.M. Everaarts (NIOZ): Side effects of insecticides in the cotton cultures of Tchad.

23 April:

- C.H. Borghouts-Biersteker (Delta Institute, Yerseke): Some aspects of the oecology of mysids.
- M. Ponds (NIOZ): The relation between oxygen consumption and activity in various species of Pomatoschistus (Gobiidae).

6 May:

- R.E. Weber (NIOZ): Comparative aspects of adaptation of haemoglobins to the Wadden Sea habitat, demonstrated with Nephtys and Arenicola (Students animal physiology, University of Amsterdam).

29 October:

- D.H. Spaargaren (NIOZ): Osmoregulation of some shrimp species from the Bay of Naples.
- R.E. Weber (NIOZ): Amino acids and the isosmotic intracellular regulation of the shrimp Crangon crangon.
- N. Spronk and N. de With (Physiol. Lab. of the Free University, Amsterdam): Some aspects of osmoregulation in the freshwater mollusk Lymnaea.

12 November:

- C. Swennen (NIOZ): Introduction parasitological work on the NIOZ.
- C. Dietvorst (student University of Nijmegen): Trematodes in snails.
- P.H. Verreyken (student University of Nijmegen): Oecology of the metacercarian stage of Meiogymnophallus minutus (Trematoda).
- P. van Banning (RIVO, IJmuiden): Parasitology in the framework of fishery.

26 November:

CICAR colloquium. Result of the KNMI-NIOZ programmes in 1970 and 1971 off the coast of Surinam and French Guyana.

A.J. van Bennekom (NIOZ): Data from literature, theses and survey of the research.

K. van der Veen (KNMI): Oceanography of the surface layer.

S.B. Tijssen (NIOZ): Chemistry and water masses in the deeper layers.

M.P. Visser (KNMI): Optical measurements.

G.C. Cadée (NIOZ): Primary production measurements.

E.C. Tjoe-Awie (NIOZ): Problems posed in the soil research of Amazon-silt and some results.

3 December:

F. Creutzberg (NIOZ): Distribution of smelt in the western Wadden Sea.

J.A. Krijgsman (student University of Leiden): Oecological research on smelt in the western Wadden area and the IJsselmeer.

C. Swennen (NIOZ): Distribution of birds in the western Wadden area.

10 December:

J.J. Beukema (NIOZ): The role of migration in the population dynamics of Macoma balthica.

J. de Vlas (student University of Groningen): Migration of young Macoma balthica in the Balgzand area.

17 December:

N. Daan (RIVO, IJmuiden): Production biology of the cod.

J.J. Zijlstra (NIOZ): The Atlanto-Scandinavian herring: changes since 1950.

M. Baars (student University of Groningen): Osmoregulation in Nereis virens.

Courses in the Institute

Courses organized by the NIOZ:

- 14 - 23 June : Marine biology NIOZ (24 participants)
 6 - 10 September : Oceanography NIOZ (19 participants)

Courses and excursions organized by Universities:

- 22 May : Excursion Zoological Institute,
 University of Köln (40 participants)
- 24 - 26 May : Course marine Zoology, Free
 University, Amsterdam
- 27 - 29 May : Course marine Zoology, Free
 University, Amsterdam
- 1 - 3 June : Course marine Zoology, Free
 University, Amsterdam
 (42 participants in all)
- 23 - 27 August : Algological working group,
 University of Leiden (12 participants)
- 4 October : Excursion biologists University
 of Groningen (25 participants)

Visitors from abroad

D.F. Alderdice, Biological Station, Nanaimo B.C., Canada.

G. Colombo, Istituto Zoologico, Ferrara, Italy.

Dr. Anna Dohrn, Head physiological department, Stazione
Zoologica, Naples, Italy.

Prof. K. Johansen, Zoophysiological Institute, Aarhus,
Denmark.

H. Milne, Culturty Field Station, University of Aberdeen,
Scotland.

A.J. Prater, British Trust of Ornithology, Tring, England.

H. Rosenthal, Biologische Anstalt Helgoland, Hamburg, Germany.

A. Verstraeten, Vogelringwerk, Deurne, Belgium.

H.H. Webber, Foods Multinational Inc., Groton, Massachusetts,
U.S.A.

S. Wood, Department of Animal Physiology, Oregon State
University, U.S.A.

Congresses attended by staff members

Ad hoc pollution studies of the North Sea (ICES), Lowestoft, 25-26 March: J.C. Duinker.

Bløden Tagging Working Group, Copenhagen, 29 March-3 April: J.J. Zijlstra.

Meeting Scientific Committee on Oceanic Research (SCOR), Madrid, 17-21 May: H. Postma.

International Meeting of the Society of Experimental Biology, Göteborg, Sweden, 19-24 July: R.E. Weber, D.H. Spaargaren and J.M. Everaarts.

Satellite Symposium of the International Physiological Congress "Comparative Physiology of Vertebrate Respiration", Göttingen, W. Germany, 1-5 August: R.E. Weber.

IIIrd Meeting of Northwest European Microbiological Group, Utrecht, 16-18 August: J.H. Vosjan.

Ad hoc pollution studies of the North Sea (ICES), Charlottenlund, Denmark, 17-18 August: J.C. Duinker.

Bløden Tagging Working Group, Copenhagen, 6-11 September: J.J. Zijlstra.

Annual Meeting, ICES, Helsinki, 26 September-1 October: A.J. van Bennekom.

Statutory meeting, ICES, Helsinki, 26 September-3 October: J.C. Duinker.

6th European Marine Biological Symposium, Rovinj, Yugoslavia, 27 September-2 October: F. Creutzberg, M. Fonds and J.W. de Blok.

Working Conference, section PM of IBP, Rome, 4-8 October: J.J. Beukema, G.C. Cadée and W.W.C. Gieskes.

Meeting ad hoc Committee SCOR: plankton atlas Indian Ocean, Kiel, W. Germany, 12-16 October: H. Postma.

IOC, Paris, 26-29 October: J.J. Zijlstra.

Meeting Intergovernmental Oceanographic Commission of UNESCO, Paris, 25-30 October: H. Postma.

North Sea Science Conference, Aviemore, Scotland, 15-20 November: D. Eisma, J.C. Duinker, H. Postma and J.J. Zijlstra.

Institutes abroad visited by staff members

J.C. Duinker: Fisheries Laboratories, Burnham on Crouch, England
(Portmann).

- Radiobiological Laboratories, Lowestoft, England (Preston).
- University of Reading, England (Bowen, trace elements).
- Fisheries Laboratories, Aberdeen, Scotland (Steele, Toppin, trace elements).

D.H. Spaargaren: Stazione Zoologica, Naples, Italy, for physiological research on shrimps during the months of February and March (by grant of Ministry of Science and Education).

R.E. Weber, D.H. Spaargaren and J.H. Everaarts:

- Zoological Station Kristineberg, Sweden.
- Zoological Laboratory, University of Göteborg, Sweden.

B. GENERAL PARTPersonnel

According to the 1971 budget the number of approved positions was 103 in all, including the director of CARMABI. At the end of the year the following places were occupied:

Research workers	24
Laboratory personnel	28
Administration and library	11
Photography and drawing office	3
Technical services	13
Crew	14
Domestic staff	3
Building office	1
	97

TurnoversEntered service

15-01-71	J. Zuidewind	laboratory assistant
01-03-71	C. van Zwieten	shipmaster
15-03-71	Mrs W. Bays-v. Splunter	editor's assistant
15-03-71	G.M. Manshanden	technician B
01-04-71	J.J. Zijlstra	director
01-04-71	J.H. Everaarts	ass. scientist
01-05-71	R. Nolting	analyst A
07-06-71	P. Passenier	laboratory servant
01-07-71	W. Klein Breteler	ass. scientist
12-07-71	R. Dapper	laboratory assistant A
01-08-71	Miss S. v.d. Vliet	secretary
01-08-71	F. Eijgenraam	analyst
15-08-71	J. Zimmerman	ass. scientist
15-08-71	G. Steenhuizen	cook
15-09-71	B. Kuipers	ass. scientist
01-10-71	W. Somer	analyst
01-10-71	J. van Halderen	ships' mechanician

01-10-71	F. Schilling	technician
01-11-71	C. Gerssen	mate
01-12-71	J.C. Groot	sailor
01-12-71	W. ten Berge	ass. scientist
01-12-71	P. Grisnich	sailor

Left service

15-01-71	Miss B. Schumacher	typist
01-03-71	G. Bisselink	analyst
01-03-71	J. Nijman	technical laboratory ass.
01-03-71	J. Bakker	handyman
01-09-71	J. Post	engineman
01-09-71	B. Witte	engine-fitter
01-11-71	W. Somer	analyst
02-11-71	P. Passenier	laboratory servant
31-12-71	P. Boer	lab. assistant A
31-12-71	C. Beke	analyst A
31-12-71	H. v. Voorst	analyst A
31-12-71	Mrs G. v. Voorst- v.d. Berg	analyst

The following members attended a course or training in 1971

Mrs J. v.d. Wal-Doornekamp	librarian I A
Miss A. Mink	shorthand
P. de Witte	engine-driver
H. Boekel	1 st part physical assistant
T. Buisman	electric and autogenic welding
R. Aggenbach	photographic laboratory ass.
C. van Zwieten	2 nd mate G.H.V.
J. Parlevliet	cooling technique
R. Daalder	painting
J. van Heerwaarden	1 st part scientific instru- ment maker
E. Paupetit	electrophoresis
J. Rommets	security measures
G. v.d. Hoek	security measures
T. Verveer	security measures
W. Jongejan	security measures
L. Heerschap	security measures

Consultation group

In the course of the year the consultation group and the management have met a few times to discuss internal affairs. From these discussions it was apparent that a code of regulations, laying down the legal position of the personnel, is urgently needed. To this end a working group has been established and discussions with representatives of the Ministry and the recognized trade unions have taken place. As a result a set of legal regulations has been drafted, which is now being discussed at the NIOZ.

Domestic affairs

When the Experiment Aquarium was taken into use early in September and several laboratories were transferred this implied a number of structural and technical provisions, which have been carried out by our own technical service.

The guest-house was taken into use in May, after which the wooden provisional hostel was partly fitted up as a central store-room. A few rooms are being reserved for possible special projects.

In spring the old hostel at the Binnenhaven in Den Helder was sold for f 28000. The Ministry has deduced this sum from the grant for 1971.

The main building at the Nieuwe Diep in Den Helder has been let out for a period of 4 years to the Helder's Fishery Cooperation at a rent of f 4000 per year. The rent is made over to the Netherlands Zoological Society.

Auxiliary departments

In the annual report for 1970 we mentioned that an engineer was to be appointed as head of the instrument dept. For several reasons, including the recent stop on the number of employees, it has been decided to postpone this appointment. For the time being Mr VAN WEERELD, from a chemical/technical college, is transferred from the group Chemical Oceanography to the Instrument dept. as a temporary head, and as a coordinator of the technical services.

In 1971 the following navigation days were made:

Ephyra 102

Eider 108

Griend 115

't Horntje 212

Curlew supply of 3800 tons of sea water

Willem Beukelsz. 50 navigation days (chartered)

Hado 35 navigation days (chartered)

On 29 September the new research vessel was launched. The Ministry was represented by Mr Sontag and van Leeuwen. Mrs H. van Zwieten-Bosma, wife of the future skipper, baptized the vessel and named it "Aurelia".

Material for Study

The acquisition of marine animals for scientific purposes amounted to f13090,--, the sale to schools and institutes to f 41812,--. To TNO and other institutions 2650 tons of seawater were delivered.

Accommodation in the guest-house

In May the new guest-house was put into use, after a housing-committee had been established. In the living units visiting scientists, postgraduate assistants and married students were housed. The single rooms are all occupied by students. The dormitories served to house the course-participants, who spent in all 630 nights here.

New buildings

As has been mentioned several times above the guest-house and the Experiment Aquarium were taken into use. Road-building and technical provisions on the new building-plot were started. The NIOZ-building office finished the scheme for internal arrangement of the head building. The drawings are now being studied by the building co-ordinator Ir. Doets. We are now awaiting the final schemes of the architect.