annual report

1970

Netherlands Institute For Sea Research

TEXEL

Annual Report

of the

Netherlands Institute For Sea Research

1970

Contents:

A. SCIENTIFIC PART

INTRODUCTION

1970 was characterized by a rapid increase in personnel, made possible by the removal of the institute to the transistorium on Texel which took place in the last months of 1969. That the latter building was finished in time is greatly due to the valuable cooperation of Ir. C.A. Doets, building director of the Free University. Now that it has been in use for a year it has been found highly satisfactory, though a reliable provision with sea water and an aquarium installation are still lacking, which meant that much experimental work had to be left undone.
All the same many valuable additions have been made to the scientific equipment of the institute. The field work profited greatly by the new vessel "Eider", which thanks to her shallow draught, is able to cover the complete Wadden Sea. In the autumn of 1970 the construction of a future North Sea vessel could be let out on tender. Thanks to improved possibilities scientific activity increased over the whole field, so that a great many claims were made on the ancillary services.

DEPARTMENT OF GENERAL MARINE OECOLOGY

The leading scientist of this department I. Kristensen left on July 12th to take over the directorate of the Caribbean Biological Institute (CARMABI) on Curaçao for the next three years or longer. For the time being F. Creutzberg, who returned from Curaçao on July 28th having spent there 6 years as a director of CARMABI, took over the dept. of marine oecology. The following subjects have been studied.

Miss S.M. van der Baan was mainly occupied in working up the macroplankton data collected at "Texel" lightship. Papers on 1. mysids, 2 migration of shrimps (Crangon crangon), 3. decapods and decapod larvae and 4. cumaceans were submitted to the editors of the Neth. J. of Sea Research but did not as yet appear in print owing to lack of space

Besides Miss van der Baan translated two doctors theses into English, one by D.H. Spaargaren and the first draught of the thesis by P.A.W.J. de Wilde. Furthermore, on behalf of R. Weber, some information out of Italian papers on the Zoological Station of Naples (into Dutch) were translated as well as several other papers and annual reports.

In 1970 P. Boer started working up fishing data of Mr. Beumkes, as well as those collected by the department of material for study (Den Helder) in the course of previous years. The latter are mainly data on fishes aquired from Den Helder cutters. Moreover he revised the collection of preserved marine animals in the NIOZ. The list is practically completed.

When the identification of those fishes was checked the sea-snails were found to contain a second species; Montagu's sea-snail, Liparis montagui (Donovan), collected in 1954 and new to our fauna. A paper of this species is to appear in "De levende natuur" in 1974.

When the data on the "kom" fishing by Beumkes were worked up the

taxonomy of mugils received a closer attention. Ever since 1941, when H.G. Redeke's "Visschen van Nederland" appeared in point, all the Dutch mugils had been called Mugil ramado (Risso). All the mugils caught by Beumkes now turned out to correspond with the characteristics of the species Chelon labrosus (Risso) = Mugil chelo Cuv. = M. labrosus Risso. From a taxonomic review of the mugils present in the collections of the Zoological Museum in Amsterdam and of the Rijksmuseum van Natuurlijke Historie, Leiden, it appeared that all mugils from inland waters belonged to the species Liza ramada (Risso) = Mugil capito Cuv. = M. ramada Risso, while practically all those from the sea belonged to the species Chelon labrosus. The results are laid down in a paper which is to appear in 1971.

Moreover P. Boer took part in a collecting trip to the northern North Sea in August, where geologists collected bottom samples. It was his task to collect and identify the evertebrates in those samples.

M. Fonds continued his work on the oecology of the gobies, Pomatoschistus minutus and P. lozanoi in the Wadden Sea. Together with H. Rosenthal from the Biologische Anstalt in Helgoland a 16 mm film on reproductive behaviour and egg-development of sea-gobies was made in April.

In May and June, again with H. Rosenthal the possibilities for cultivation of garfishes on an industrial scale were investigated. Eggs and sperm were stripped from nature animals, obtained from the institute's fisherman, Mr. Beumkes, and the embryos and larvae were reared in the laboratory. A number of sets of fertilized eggs were brought to the laboratory of H. Rosenthal at Hamburg for embryological and cultivation research. A joint paper by Rosenthal and Fonds will be submitted to "Marine Biology" in 1971.

In August tagging experiments were carried out, to obtain information on migration routes. Garfishes (Belone belone), horse mackerals (Trachurus trachurus), thick-lipped mullets (Chelon labrosus) and sea-trouts (Salmo trutta) some 100 specimens in all were tagged and released. Up to the end of 1970 no recoveries have been recorded to try the best tagging procedure to now.

In the last three months of the year preparations were made for a (renewed) research on the influence of water-temperatures on standard and active metabolism in Gobiidae. The set-up and apparatus were improved. The aim of the research is to find out at which temperatures activity reserves are greatest for various species of Gobiidae, and to correlate these findings with the pattern of distribution.

A.D.G. Dral made some final experiments concerning the function of intrabranchiol muscle cells in food intake of mussels. The same subject was approached from the histological point of view, which yielded sufficient data to regard this subject as closed. A publication is being prepared. The results of research on another detail of the mussel's feeding mechanism - viz. regulation of the amount of water circulated by pumping, as related to temperature and salinity - were summarized in a paper to the editors of the Neth. J. of Sea Research.

Much attention was paid to the anatomy of the eye of the bottle-nosed dolphin Tursiops fruncatus. Additional material of the species as well as of other Cetacea, Pinnipedia and Sirenia was obtained through the "Dolfinarium" at Harderwijk, the Zoological Museum and Zoological Laboratory in Amsterdam and the Texel Museum. The cooperation of J.L. Blanksma, an occulist from Groningen for opthalmoscopical observation of the living animal was greatly appreciated. The results of anatomical research on the

Tursiops' eye will lead to some publications of which the first is now practically completed. It will shortly be submitted to the editors of the Ztschr. f. Säugetierkunde.

Closely connected with this investigation was another one on vision of the bottle-nosed dolphin, to be carried out in the "Dolfinarium" at Harderwijk. After consultation with Prof. Dr. S. Dijkgraaf and under the direction of Dr. W.H. Dudok van Heel (curator of the "Dolfinarium") and A.D.G. Dral this research was taken up in April by J.W. Noordenbos (biological student, Utrecht) and continued in October by Miss M. van Duyl (also from Utrecht). Since the animal in question had been caught only quite recently, its training took rather a long time and nothing can be said as yet about the results of this research.

DEPARTMENT OF MIGRATION AND ORIENTATION

On September 15th the establishment and promotion of the department "Migration and orientation of marine animals" was entrusted to Dr. F. Creutzberg, in order to get informed on the present state of this research in the Netherlands he visited the State Institute for Fishery Research at IJmuiden, the Laboratory for Comparative Physiology at Utrecht, the Oecology Department of the Zoological Laboratory at Leiden and the Delta Institute for Hydrobiological Research at Yerseke.

The dept. of migration and orientation will try to obtain a general picture of movements and distribution of various species in the Wadden Sea, based on field data, while on the other hand the migration and orientation mechanism will be approached by experimental research.

DEPARTMENT OF PRODUCTION AND FOOD-CHAIN RESEARCH

The aim of this research is to arrive at a quantitative description of the principal food-chains in the Wadden Sea and adjoining part of the North Sea. To this end measurements are being made concerning primary production by benthic diatoms (Cadée) and phytoplankton (Cadée and Gieskes) and secondary production by benthic fauna (Beukema: field work, de Wilde: metabolism measurements) and birds (Swennen).

In the course of 1970 a fifth scientist joined the group: Dr. W.W.C. Gieskes, who started a research sponsored by Z.W.O. on primary production and composition of phytoplankton in the near North Sea. In particular he is to study the influence of water from the Rhine on the above process. Z.W.O. further promotes the food-chain research as part of the I.B.P. by paying the salary for an analyst (Berghuis).

Primary production

Dr. G.C. Cadée continued his measurements of primary production on emerging tidal flats. Besides the location near 't Horntje measurements were also taken near the observatory platform which was stationed at a place which is probably more representative for the western Wadden Sea. Over a complete year the vertical distribution of living and dead chlorophyll in tidal flats was determined. It appeared that in all seasons a prominent part of both types of chlorophyll was to be found in the dark, several cms below tha sand's surface. When exposed to light this submerged, living chlorophyll immediately resumed photosynthesis. Experiments with Arenicola led to the conclusion that these animals are not the main cause of the living chlorophyll getting buried. It is most likely that water movements and especially waves are a much more important factor.

Moreover Cadée took part in the CICAR project by measuring potential primary production in the Caribbean and the Atlantic north of Surinam and French Guyana.

In August Dr. W.W.C. Gieskes started preparations for measuring primary production in the North Sea and population dynamics of plankton.

Secondary production.

Dr. J.J. Beukema continued his measurements on density and growth of a number of bottom animals in the Balgzand. Now that the results of measurements during three years are known it appears that, from one year to the next, some of the main species (especially the cockle) produce strongly fluctuating amounts of flesh and shell-lime. This variation is mainly connected with fluctuations in the population density due to repeated failure in reproduction. Local variation may also be considerable. Therefore in future the research will be extended to include other parts of the Wadden Sea. Fortunately the variations in growth rate are much smaller and better predictable from only a few data.

Production in the form of shell-lime considerably surpassed that of flesh. Cadée found that practically all shells were drifted into the gulleys soon after the death of the animal.

Research on production of bottom animals in the adjoining parts of the North Sea was started this year by comparing the results of two different kinds of bottom samples: the Reineck-Kastengreifer and the van Veen-grab. The first collects the burrowing animals quantitatively. Observations with the latter apparatus were found to need only a slight correction.

Preliminary data on biomass of the bottom fauna in the North Sea off Texel point to a minor role of the bottom fauna in food-chains, contrary

to the situation in the Wadden Sea.

M. Brinks (student of biology, Leiden) continued his work on young Macomas which he started in 1969, and to which he now added another three months period of observations. He closed this subject by a lecture in one of our colloquia and a report.

For six months W. Klein Breteler (student of biology, Leiden) measured density and growth of young store crabs on the Balgzand and calculated the pertaining production of flesh.

A. van Kuyen (student of biology, Leiden) started measuring the daily growth of cockles by observing the extremely thin rings which can be observed on sections of the shell.

P.A.W.J. de Wilde continued his research on the extent of the metabolism in some major secondary producers of the Wadden Sea. Macoma was reared at 5,15 and 25° C and prolonged measurements of growth, mortality, activity, behaviour and oxygen consumption have been carried out. It was possible by adjusting the experimental set-up, to arrive at a continuous observation and registration of respiration in animals showing their normal behaviour because they could stay in their burrows during the experiment. Another set of experiments, for measuring four animals at the same time, is being fixed. The necessary apparatus made a heavy demand on our budget, but the main part of it has now been acquired.

Bird research.

C. Swennen observed incubating eider-ducks on Vlieland. The population showed a slight tendency to restoration. Due to poisoning by taken up with the food the original breeding population of 4000 nest at the end of the fifties had been reduced to less than 1000 in the course of the

sixties. Ringing research could now be resumed. Nearly 600 incubating females have been ringed. For the first time after a number of years no significant mortality of incubating ducks occurred at the end of the nesting season.

Experiments on food uptake and growth in the public of black-headed gulls were continued. G.R. de Vries (student of biology, Groningen) assisting for some months, besides continuing his former student's subject on taste-preferences in seabirds. It appears that not only the food should be palatable, but also that some variation in the menu is one of the factors deciding how much a bird is going to eat, and consequently how quickly it will grow.

The chances of acquiring birds alive, for ringing and other purposes were greatly increased this year by introducing a cannon-net of a type designed by the Oecological Institute of Arnhem. It appeared from the first results obtained with this net that oystercatchers, assembling in groups during high tide, gather in separate year-classes.

J.A. Krijgsman (student of biology, Leiden) started a research on population structure, parasites of and predation on smelt in the Wadden Sea.

DEPARTMENT OF EXPERIMENTAL BIOLOGY

The research during the past year was directed at obtaining greater insight into the mechanisms govering the life processes studied. Dr. R.E. Weber and D.H. Spaargaren studied comparative aspects of O_2 binding of blood pigments and of osmoregulation in littoral annelids and in shrimps, whilst J.H. Vosjan studied processes of bacterial sulphide production (by Desulfovibrio) in mud-flats. The marine microbiological research was strengthened by the appointment from Jan. 1st of Miss A. ten Hoor as postgraduate assistant to work on sulphide metabolism of microorganisms (Thiobacilli).

On April 1st G.W. Kraay was appointed assistant to Dr. Weber.

Dr. R.E. Weber studied the influence of laboratory temperature acclimation on oxygenational properties of the haemoglobin of Arenicola marina. He also started a study of the influence of mercurial site-specific poisons of the protein on its functional properties. A muscle haemoglobin was isolated preparatively from the body wall for oxygenation studies and its polymorphism characterized in electrophoresis experiments.

During a stay at the Stazione Zoologica in April and May Weber conducted comparative functional studies on haemoglobins of related Arenicolidae and of other annelids with corresponding high molecular weight haemoglobins. For the vascular and coelomic haemoglobins of Nephtys hombergii an O_2-transfer system consistent with oxygen tensions in nature and with available data on its respiratory physiology could be traced. With the incorporation of comparative data on material from intertidal Texel flats, two communications were prepared.

Weber moreover continued his research on the osmotic significance of haemolymph and intracellular amino acids in the shrimp Crangon crangon. Tissue concentrations were high and showed positive correlation with environmental salinity, indicating its value as intracellular balance for blood osmolarity variations. In studies on cation regulation results were booked mainly with Na^{+} and Ca^{+++}.

As part of the research on the mechanism of osmoregulation in shrimps D.H. Spaargaren carried out a series of experiments in which a further insight into-cellular regulation was gained.

By measuring osmotic concentration, electrolyte, non-electrolyte and chloride concentration in homogenates of shrimps the intra-cellular concentrations could be estimated by comparing the results with the composition of the blood.

Together with the results obtained in 1969 the above data could be laid down in a doctors thesis.

A new research on the relation between osmoregulation and the energy expended by the animal was set up. Possibilities for measuring heat production and making electrodiagrams of shrimps were tested out.

J.H. Vosjan continued his research on the energy metabolism of sulphate-reducing bacteria. It was tried to locate the spots where phosphorylation took place by using cell-free extracts, however, it was found that such preparations could not be made. It appeared too, from literature, that cell free extracts which reduce sulphate have never been obtained, though in some papers such extracts are mentioned, which will reduce sulphite. Experiments in which the growth of Desulfovibrio in cultures was measured continuously showed a growth in two stages, which could not be explained

as yet. It also appeared that changes in the culture-medium (pH, Eh, salinity) more affected the adaptation time of a culture than the eventual growth rate. Samples from six trips over the Wadden Sea were tested for the relation between sulphate and chlorinity.

Miss A. ten Hoor started research on the micro-biological oxidation of reduced S-compounds. In the first place it was tried to arrive at an isolation which as far as possible approached natural conditions, also keeping in mind the selective effect of the concentration in the substrate. To this end a continuous culture of Desulfovibrio was used, which provided the H_2S. The continuous culture was connected to a column of sea-water, inoculated with the appropriate mud. In this way, apart from the produced matter, the possibility of establishing a H_2S/O_2 gradient was also created. However, it was found to be very difficult to obtain a stable column, mainly due to occurring thermoturbulences. In the mean time this problem has been solved. Some strains have already been isolated, though their specific place in the gradient has not been established as yet. At present experiments are in progress with different H_2S productions in order to solve this problem. A tentative experiment in measuring the growth in a continuous culture of one of the isolated organisms has also been undertaken.

In February J.C. van Vaupel Klein (student of biology, Leiden) wound up his research on the influence of salinity on distribution of the copepod Eurytemora affinis.

Following his sojourn abroad J.M. Everaarts (student of biology, Groningen) continued his research on the qualitative and quantitative effect of salts on the functional properties of the haemoglobin from Arenicola marina

This research started on June 1st.

From March to August H. van Vliet (student of biochemistry, Free University, Amsterdam) studied the functional and molecular aspects of haemocyanin O_2 binding in the shrimp Crangon crangon..

M.L.J. van de Berg (student of geology, Utrecht) studied the effect of environmental factors of sulphate reduction. He continues his work on sulphate reducers in the University of Bristol (organic geochemistry unit).

DEPARTMENT OF MARINE GEOLOGY AND GEOCHEMISTRY

Dr. D. Eisma finished the research on ocean sediments. started in coöperation with Dr. E.K. Duursma (IAEA, Monaco). The results were laid down in an internal report 1970-8. The results of the research on the Surinam shelf carried out in 1969 on board Hr. Ms. Luymes (O.C.P.S. II) have been summarized by D. Eisma and A.J. van Bennekom in a publication which is to appear in 1971 in a Special Publication of the Hydrographic Newsletter. Since a great many mud samples from the Amazone area and the coastal area off Guyana were at our disposal (at the Stichting voor Bodem Katering", Wageningen and at the NIOZ) it was possible to find out whether the composition of mud deposited by the Amazone and mud from the Guyana coast was really identical. The research involved the use of X-ray diffraction with additional analyses of specific surface, humus content etc. The results have been prepared for publication by D. Eisma and H.W. v.d. Marel. Research on the sediment samples from Walvis Bay, and in due time also from the North Sea, entailed the necessity of a reliable quantitative determination of amorphous SiO_2 (diatoms etc.). In England good results have been obtained with the infrared method, however, since there is an X-ray diffractometer in the NIOZ but no infra-red apparatus a workable X-ray method seemed worth while. A fair result was obtained by measuring the so-called opal "bulge". A paper on the subject, by D. Eisma and S.J. van der Gaast, is in press. In the meantime a method for - if possible - quantitative analysis of feldspar in sediments was applied. In the last months of 1970 the results of measurements on Breid Bay samples were received from the Reactor Centre, a publication on this subject is in preparation. The Mathemical Centre at Groningen had not yet finished the calculations on grain size data from the southern North Sea by the end of

of 1970, so that this subject could not as yet be taken up.

A.J. van Bennekom continued research on the silicon cycle in the southern North Sea. The year's work concerned mainly the silica content of diatoms. Samples were taken from the southern Bight in March and August and from the English Channel in April on board Hr. Ms. "Vos".
By means of an alpha spectrometer acquired in this year and some auxiliary apparatus given on loan by Philips Ltd. work on neasurement of Si-32 was started. Due to instrument failure and the unexpectedly high demands of time the CICAR project made, progress was smaller than expected.
In July the coördination of the scientific programsof CICAR cruises 16 and 17 was taken from Eisma.
Coöperation with the Brazilian Navy in this project had to be arranged. Experimental work was carried out in September and October. A preliminary report will be presented to the CICAR conference in Trinidad (April 1971).

J.H.F. Jansen entered service on June 1st as a postgraduate assistant to investigate the sedimentology of the northern North Sea. Two trips were made; the first (15-19/VI) served to try out several apparatus, to which end the deeper part north of Dogger Bank (Devils Hole, down to 260 m) were visited. During the second trip (17-28/VIII) bottom samples were taken in 72 localities between the Norwegian trough and the Shetlands. This sampling could be combined with the collecting of bottom fauna by P. Boer and light absorption measurement by J. van Lonkhuizen (University of Leiden) and R. Berends (University of Utrecht). At present the bottom samples are being investigated for mineralogical composition and grain size.

E.C. Tjoe Awie also entered service (of ZWO) on June 1st, for research on transport and sedimentation of Amazone mud. As part of the CICAR programme he took part in three journeys, viz. in the Brazilian research vessel "Almirante Saldanha" (24/IX-4/X and 8/X-19/X) and one on Hr.Ms. "Luymes" (24/X-4/XI). During the period 24/IX-16/X samples (suspended matter and bottom) were taken from the "Luymes" by Cadée. Altogether 83 samples of suspended matter, 61 bottom samples and 3 cores were taken from the "Almirante Saldanha" and from the "Luymes" 128 samples of suspended matter and 27 bottom samples. The area covered by the "Almirante Saldanha" was situated off the Brazilian coast between the Amazone and the frontier of French Guyana. From the "Luymes" the shelf off French Guyana and Surinam east of the Surinam river was sampled. In the period preceding the CICAR programme Tjoe Awie took part in the GEOMAR II project, which attempts to map the lithofacies of the Brazilian continental margin. This was directed by Prof. M.A. Gomi from the Instituto de Geociêcias de Universidade do Rio de Janeiro, Insitute of Geosciences of the University of Rio de Janeiro.

H. Aalders (student from the Free University, Amsterdam) finished his research on sediment structures in a number of box-cores from the southern North Sea. A summary of the experiences obtained with various hardening techniques appeared as internal report 1970-5. The remaining results are being worked out.

R. Misdorp (student from Amsterdam University) finished the practical part of his research on the possibility of using trace elements in the silt-fraction as tracers. The results are being worked up.

G.C.M. van der Veer (student from University of Utrecht) investigated the cycle of silicic acid of the western Wadden Sea from February till July, assisted by H. van Voorst. From August to January 1970 this research was continued by H. van Voorst and Mrs. E. Krijgsman-van Hartingsveld who entered service as an analyst on August 1st. The results are well in accordance with previous data from the North Sea and IJsselmeer.

DEPARTMENT OF CHEMICAL OCEANOGRAPHY

Besides his work as a director Prof. Dr. H. Postma found little time to spend on scientific work. Together with J. Rommets amd R.W. Manuels a chemical-hydrographical research project was started in April which is to cover the complete Wadden Sea area from Den Helder to the river Eems. To this end a sampling trip with the "Eider" is made every month of the year. D. Meyers (student of biology, Free University, Amsterdam) and V. de Jonge (student of biology, University of Nijmegen) took part in this research. It is intended to give a better insight into the chemical differences of water masses in various parts of the Wadden Sea, the composition of organic matter and plankton and moreover in the increase of nutrient concentrations due to eutrophication of coastal water. L. van der Vate (student of the University of Utrecht) completed the construction of a photometer and used to establish the depth to which natural light of different wave-lengths penetrates into various kinds of water (North sea, Wadden Sea and IJsselmeer). This research was continued by the students J. van Lonkhuizen (University of Utrecht) and R. Berents (University of Utrecht). It appeared clearly from these observations that in the North Sea blue light penetrates farthest, and in coastal waters red light.

Dr. S.B. Tijssen started working up his data on the southern North Sea. In the first place attention was given to the distribution of salinity. In a paper, read atcolloquium, the average picture from eight trips concerning water budgets as concluded from salinity distribution, advective transport and stratifaction, was considered. In the laboratory the automation of chemical analyses was further studied, together with J.J.A.

van Weereld. The latter joined as a guest on the trip with the Brazilian research vessel "Almirante Saldanha" during part of the Netherlands CICAR-cruise. Tijssen took part in this research on board of the "Luymes" (see van Bennekom).

Trying out the apparatus for automatical analysis of nutrients resulted in a failure because the apparatus was badly damaged during the crossing to Surinam. Preliminary work on the expedition and correction of the obtained observational data took up a great deal of time.

W. Helder entered service on May 1st, and is to study especially the quantitative aspects of the N-cycle in the southern North Sea, if possible including some of the microbiological aspects.
D. Meyers (student of biology, Free University of Amsterdam) started research on N-components in the Wadden Sea.

NETHERLANDS JOURNAL OF SEA RESEARCH

In 1970 the Netherlands Journal of Sea Research was issued directly by the Institute, thereby obtaining a position different from that of the Netherlands Journal of Zoology, which remained a publication by the Netherlands Zoological Society. This change was reflected in the superscription on the cover of the first issue of volume 5. The editors will comprise 3 collaborators from the NIOZ and 2 from other marine research institutes. The present editors are: J.W. de Blok (executive editor), H. Postma, R.E. Weber, R. Dorrestein (KNMI, de Bilt) and P.H. Nienhuis (Delta Institute Yerseke).

In 1970 2 issues appeared: vol. 4 nr. 4 (April) and vol. 5 nr. 1 (November), containing 9 papers (229 pages). Since an increasing number of manuscripts are sent or promised to the editors it will be attempted to publish one volume, comprising 4 issues every year.

During 1970 19 manuscripts were handed, 3 were taken up in 1970, 6 will be published in the first issue of 1971, 4 will be published in the following issue, 3 are still thought over, 1 was withdrawn and 2 were refused.

Publications (appeared in 1970).

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BEUKEMA, J.J. Angling experiments with carp (Cyprinus carpio L.) II Decreasing catchability through one-trial learning. - Neth. J. Zool. 20: 81-92.

_____. Acquired hook-avoidance in the pike Esox lucius D. fished with artificial and natural baits. - J. Fish. Biol. 2: 155-160.

_____. Measurement of the flesh production of the bivalves of the Balgzand region near the town of Den Helder, as part of a study on food chains in the Waddenzee. - Neth. J. Zool. 20: 407-408.

_____.De Waddenzee een bijzonder milieu. - Chem. Weekbl. 66: 62-66.

BLOK, J.W. de, S.J. van der GAAST, M.W. MANUELS & H. POSTMA. Hydrochemische waarnemingen in de Lindevallei. - Med. hydrobiol. Veren 4 (2): 59-69.

BOER, P. Nederlandse namen voor Nederlandse zeevissen. - Zeepaard 30 (5): 71-87.

EISMA, D & W.J. WOLFF. The distribution of Branchiostoma lanceolatum (Cephalochordata) in the coastal waters of the Netherlands and the southern North Sea. - Neth. J. Sea Res. 5 (1): 101-107.

FONDS, M. Remarks on the rearing of gobies (Pomatoschistus minutus and P. lozanoi) for experimental purposes. - Helgoländer wiss. Meeresunters. 20: 620-628.

GIESKES, W.W. The Cladocera of the North Atlantic and the North Sea: biological and ecological studies. Ph. D. thesis. McGill University Montreal, Canada.

POSTMA, H. & J.W. ROMMETS. Primary production in the Wadden Sea. - Neth. J. Sea Res. 4: 470-493.

POSTMA, H. Het chemisch onderzoek der oceanen. - Chem weekbl. 36: 37-41.

_____. Chemistry of coastal lagoons. Lagunas Costeras, un symposio Mem. Simp. Int. UNAM-UNESCO. Mexico D.F. 421-430.

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_____. De vondsten van zeenaaktslakken in de afgelopen periode. - Zeepaard 30: 31-35.

SWENNEN, C. & A.L. SPAANS. De sterfte van zeevogels door olie in februarie 1969 in het Waddengebied. - Vogeljaar 18: 233-245 (Summary in English).

TIJSSEN, S.B. On the precision of conductivity-salinity determinations ICES, information on techniques and methods for sea water analysis. An interlaboratory report (1970) no. 3: 33-35.

VOSJAN, J.H. ATP generation by electron transport in Desulfovibrio desulfuricans. - Antonie van Leeuwenhoek. J. Microbiol. Serol. 36: 584-586.

WEBER, R.E. Relations between functional and molecular properties of annelid haemoglobins. Interactions between haems in the haemoglobin of Arenicola marina L. - Comp. Biochem Physiol. 35: 170-189.

WEBER, R.E. & D.H. SPAARGAREN. On the influence of temperature on the osmoregulation of Crangon crangon and its significance under estuarine conditions. - Neth. J. Sea Res. 5 (1): 108-120.

Internal reports (appeared in 1970).

HAMER, R.J. On sulphate reduction and the occurrence of Fe in the Wadden flats (in Dutch). no. 1970-1.

BOER, P. Parasitic copepods on fishes off the Dutch coast (in Dutch). no. 1970-2.

WEBER, R.E. Subjects for postgraduate students in the NIOZ (in Dutch). no. 1970-3.

EISMA, D. Sediment transport and water movement on the Guyana shelf (in Dutch) no. 1970-4.

AALDERS, H. Experiences with making lacquer profils from samples taken with a kastengreifer (in Dutch). No. 1970-5.

TIJSSEN, S.B. Instruction for salinity determination of seawater with an inductively coupled salinometer (in Dutch). no. 1970-6.

SCHUITEMA, K.A. Distribution and displacement of Cardium edule L. within a population (in Dutch). No. 1970-7.

EISMA, D. Composition and exchange capacity of deep sea sediments, part 2. No. 1970-8.

SCHRÖDER, H.G.J. Results of a hydrographical investigation in the Wadden Sea north of the coast of Groningen in April and September 1968 (in Dutch). No. 1970-9.

VLIET, J. van. Structure and function of C. crangon haemocyanin (in Dutch) No. 1970-10.

Lectures by members of the staff.

BENNEKOM, J.J. van. The silicic acid cycle in the southern North Sea, Geochemical Cercle, Utrecht, 29-5-1970.

BEUKEMA, J.J. Flesh and shell lime production of Macoma balthica on the Balgzand. Netherlands Zoological Society, Texel 1-5-1970.

_____. On bottom grabs and biomasses. Hydrobiological Society, Texel, 20-11-1970.

BLOK, J.W. de. Hydrochemical observations in the Linde Valley. Hydrobiological Society, Austerlitz.

CADÉE, G.C. Primary production on the wadden flats, Netherlands Zoological Society, Texel, 1-5-1970.

DRAL, A.D.G. Preliminary results of research on the eye of Tursiops truncatus. Netherlands Foundation Cetacea Research, Amsterdam, 12-3-1970.

EISMA, D. Formation and distribution of shell-grit. Neth. Zoological Society, Texel, 1-5-1970.

_____. Sediment transport and water movement on the Guyana shelf. Geol. Inst. Leiden, 20-3-1970.

_____. Sand transport in the southern North Sea area, Neth. Pedological Soc., Groningen, 31-5-1970.

FONDS, M. Seasonal occurrence of sea gobies with a film on reproductive behaviour and egg development. Biol. Anst. Helgoland, Hamburg, 5-6-1970.

GIESKES, W.W.C. Possible causal relation between seasonal succession of two Podon (Cladocera)-species and seasonal succession of their possible food in the North Sea. Hydrobiol. Soc., Texel, 20-11-1970.

HOOR, A. ten. Isolating Thiobacillus. Hydrobiol. Soc., Texel, 20-11-1970.

SPAARGAREN, D.H. Research on the osmoregulation mechanism of the shrimp, Crangon crangon. Neth. Zool. Soc., Section of Compar. Physiol.,

Wageningen 10-10-1970.

_____. On mechanisms and the oecological significance of osmoregulation in the shrimps Crangon crangon (L.) and C. allmanni Kin. Hydrobiol. Soc., Texel 20-11-1970.

SWENNEN, C. The food of the eider (Somateria mollissima) in the Dutch Wadden Sea. XV Congr. Int. Orn., The Hague 3-9-1970.

_____. Infection by parasites as the cause of death in herring gulls. Hydrobiol. Soc., Texel 20-11-1970.

VOSJAN, J.H. On the energy metabolism of Desulfovibrio desulfuricans. Neth. Microbiol. Soc., Utrecht, 15-5-1970.

_____. Formation of sulphide, Hydrobiol. Soc., Texel 20-11-1970.

WEBER, R.E. On the influence of some physical factors on the oxygen binding of Arenicola haemoglobin. Conf. of the Br. Soc. of Exp. Biol., Birmingham, England 9-1-1970.

_____.Functional and structural properties of high-molecular haemoglobin in worms, studied by means of an oxygen-chamber technique. Biol. Faculty, University of Louvain, Belgium 5-2-1970.

_____. Genetic aspects of the variation in oxygen binding properties in the haemoglobin of lugworms. Vth Eur. Mar. Biol. Symp., Venice, Italy 7-10-1970.

_____. On the effect of certain environmental factors on the function of haemoglobin in lugworms. Hydrobiol. Soc., Texel 20-11-1970.

WILDE, P.A.W.J. de. Regulation of shell-water in the land hermit crab Coenobita clypeatus (Herbst). Neth. Zool. Soc., Nijmegen 9-1-1970.

_____. Influence of temperature on the growth of Macoma balthica L. Hydrobiol. Soc., Texel 20-11-1970.

Colloquia and lectures in the institute.

January 23rd

J.T.F. Zimmerman (student Free Univ., Amsterdam): Some observations on waves in the Wadden Sea.

J.W. de Blok (NIOZ): Hydrographical observations in the Linde valley.

January 30th

J.C. Kreffer (Hydrogr. Office Roy. Navy): Hydrographical observations on the Surinam shelf.

A.J. van Bennekom (also on behalf of D. Eisma): Water movement and nutrients on the Surinam shelf.

W. Chr. de Kock (TNO Lab. of corrosion and anti-fouling, Den Helder): Fishery research on the Surinam shelf.

February 20th

H. Veldkamp (Microbiol. Lab., Univ. of Gronongen): Marine microbiology.

J.G. Kuenen (Microbiol. Lab., Univ. of Groningen): Research on Thiobacillus.

March 13th

D.H. Spaargaren (NIOZ): Processes of intake and secretion of salt in the shrimp.

R.E. Weber (NIOZ): The contribution of amino-acids to the osmoregulation of shrimps.

P.A.W.J. de Wilde (NIOZ): Regulation of shell-water in land hermit crabs.

April 10th

S.B. Tijssen (NIOZ): Horizontal and vertical distribution of salt in the southern North Sea.

A.J. van Bennekom NIOZ): Distribution and chemical composition of phytoplankton in the southern North Sea.

April 24th

H. Brinks (student Univ. of Leiden): Migration of young Macoma balthica (L.) in the Balgzand Area.

J.C. Vaupel Klein (student Univ. of Leiden): Distribution in relation to salinity of the copepod Eurytemora affinis in the western Wadden Sea.

May 15th

R. Boddeke (RIVO, IJmuiden): Biological changes in the western Wadden Sea as related to fish supply.

M. Fonds (NIOZ): Seasonal occurrence of bottom fishes in the western Wadden Sea.

October 2nd

H. van Gemerden (Microbiol. Lab., Groningen): A new type of photosynthetic bacterian.

T.A. Hansen (Microbiol. Lab., Groningen): Ecology of marine photosynthetic bacteria.

October 16th

K.F. Vaas (Delta Institute, Yerseke): Changes in fish fauna of the Veerse meer, especially concerning plaice.

G.J. Heerebout (Rijksmus. Nat. Hist., Leiden): Distribution and migration of North Atlantic shrimps.

October 30th

R.E. Weber (NIOZ): Haemoglobins of Nephthys.

H. van Vliet (student Free University, Amsterdam): Structure and function of haemocyanin in C. crangon.

J.M. Everaarts (student University of Groningen): Influence of salts on O_2-binding of Arenicola haemoglobin.

November 13th

G.H. Hughes (University of Bristol): Respiratory function of fish gills in relation to their dimensions.

C.M. Ballintijn (Zool. Lab., Univ. of Groningen): Electromyographic analysis of the function of the adductor mandibular in a swimming carp.

W.W.C. Gieskes (NIOZ): The Cladocera of the North Atlantic and the North Sea: Ecological studies with the Hardy Plankton Recorder.

November 27th

W.H. Dudok van Heel (Dolfinarium, Harderwijk): Cetacea research in the Netherlands.

P.J.H. van Bree (Zool. Museum, Amsterdam): Some taxonomic problems in small Cetacea.

A.D.G. Dral (NIOZ): Anatomy and function of the eye of whales.

J.W. Noordenbos (University of Utrecht): Vision of bottlenosed dolphin.

December 11th

J. Amesz (Lab. for Biophysics, Leiden): Developments in photosynthesis research.

H. Donze (Lab. for Biophysics, Leiden): On rearing photosynthetic migro-organisms.

Courses held in the institute.

April 22 - 24	Course Zoological Laboratory, Utrecht. (12 participants)
May 25 - 30	Course on marine animals by the subfaculty of biology of the Free University, Amsterdam. (38 participants).
June 8 - 17	Biological course NIOZ (9 participants).
September 16 - 18	Course Zoological Laboratory, University of Amsterdam. (29 participants).
September 23 - 25	Course Zoological Laboratory, University of Amsterdam. (27 participants).

Visitors from abroad (in 1970).

E. Bøgebjerg and A.H. Joensen, Vildtbiol. Station, Rønde, Denmark.

M.H. Daro, C. Joiris, J.P. Mommaerts and Mrs. Mommaerts, Free University dept. ecology and taxonomy, Brussels, Belgium.

H. Holy, Technicon International, Geneva, Switzerland.

G.M. Hughes, Research Unit for Animal Respiration, University of Bristol, England.

T. Kikuchi, Amakusa Marine Biological Laboratory, Kyushu University, Japan.

R. Lontie and Mrs. G. Préaud, Laboratory for Biochemistry, Roman Catholic, University, Louvain, Belgium.

H. Rosenthal, Biol. Anstalt Helgoland, Hamburg, W. Germany.

P. Saurola, Dept. Ecology, University of Helsinky, Finland.

F. Uyeno, Faculty of Fisheries, Prefectural University of Mie, Japan.

H. Verwey, Memorial University, New Foundland, Canada.

Congresses visited by staff members.

157th Conference of the British Society for Experimental Biology, Birmingham, 5-9 January: R.E. Weber.

Symposium on composition, preparation, sterilization and checking of culture media, Wageningen, 4 March: Miss A. ten Hoor and J.H. Vosjan.

S.C.O.R. Symposium Working Group 31, Geology of the East Atlantic Continental Margin, Cambridge, 23-26 March: D. Eisma.

Xth International Congress on microbiology, Mexico-City, Mexico, 9-15 August: J.H. Vosjan.

International Ornithological Congress, The Hague, 30 August-5 September: C. Swennen.

Advanced Study Institute, Dynamics of numbers in populations, Oosterbeek, 7-18 September: J.J. Beukema.

International Oceanographic Congress "The Ocean World", Tokyo, 12-26 September: H. Postma.

ICES Congress, Copenhagen, 28 September-2 October: J.C. Duinker and W. Helder.

Vth European Marine Biological Symposium, Venice 5-11 October: J.W. de Blok, M. Fonds, R.E. Weber and P.A.W.J. de Wilde.

F.A.O. Conference on Marine Pollution, Rome 3-14 December: H. Postma.

8-18 December: J.C. Duinker.

Foreign institutes visited by staff members.

A.J. van Bennekom: Instituto de Pesquisas e Experimenta çoes Agropecuárias do Norte en "Almirante Saldanha" in connection with planned research off the Brazilian coast.

A.D.G. Dral: Marsvin Stationen Marine Bio-acoustics Investigations, (Søren H. Andersen), Strib (Havn), Denmark.

D. Eisma: SACLANT ASW Research Centre, in connection with acquisition of sphincter cover, which has been developed there (24/IV-29/IV). On the way there visited Duursma (IAEA, Monaco) for joint research.

M. Fonds: Biologische Anstalt Helgoland, Hamburg, for garfish research together with H. Rosenthal.

D.H. Spaargaren: Station Biologique, Roscoff France.

E.C. Tjoe Awie: Instituto de Pesquisas e Experimenta çoes Agropecuárias do Norte, in connection with possible cooperation with NIOZ in Amazone estuary.

J.H. Vosjan: Nitrogen Fixation Unit (J.R. Postgate), University of Sussex, Brighton, England.

R.E. Weber: Zoological Institute, Roman Catholic University, Louvain, Belgium (on invitation).

Oceanography Department, University of Southampton;

Kobenhavn Universitets Ferskvands-biologiske Laboratorium;

Zoophysiologisk Laboratorium A, Copenhagen University.

B GENERAL PART

Personnel

According to the 1970 budget the total number of available positions was 95, including the director of CARMABI.

At the end of the year the following places had been occupied:

Research workers	20
Laboratory personnel	28
Administration and library	9
Photography and drawing	3
Technical services	11
Vessels	10
Domestic staff	9
Building office	1
	91

Entered service.

01-01-70	Mr. W.P. Jongejan	assistant fisherman
01-01-70	Miss M. Goënga	laboratory assistant
01-01-70	Miss A. ten Hoor	scientific assistant
01-01-70	Miss L. Zuurhout	analyst
01-01-70	Mr. J. de Vries	laboratory servant
01-01-70	Mr. J.C. Nolthenius	library assistant
26-01-70	Mrs. A. Mulder-Retsema	telephone operator
09-03-70	Mr. R. Daalder	carpenter
16-03-70	Mrs. J. v.d. Wal-Doornekamp	library assistant
01-04-70	Mr. G.W. Kraay	analyst

01-04-70	Mr. W. de Bruin	analyst
01-04-70	Mr. G. v. Houweninge	scientist
11-05-70	Mr. P. Witte	sailor
01-06-70	Mr. J.H.F. Jansen	postgraduate assistant
01-07-70	Mr. W. Helder	scientist
01-08-70	Mrs. G. v.d. Voorst-v.d. Berg	analyst
01-08-70	Mr. B. Verschuur	draughtsman
01-08-70	Mr. J. v. Heerwaarden	apprentice instrument-maker
01-08-70	Mr. F.J. Parlevliet	engine driver
01-08-70	Mrs. E. Krijgsman-v.Hartingsveld	analyst
01-09-70	Miss G.H. Witte	library assistant
01-09-70	Mr. J.C. Duinker	scientist
01-09-70	Mr. J. Nijman	technical laboraty assistant

left service:

28-02-70	Mr. J. Westenberg	scientist
28-02-70	Mr. B. Schrieken	laboratory assistant
16-04-70	Mr. J.C. Nolthenius	library assistant
01-05-70	Mr. M. Mulder	laboratory ass. A
17-05-70	Mrs. J. Mulder-Starreveld	library assistant
31-05-70	Mr. J. v.d. Star	apprentice fisherman
31-08-70	Mr. F. de Groot	head technician
31-12-70	Mr. P. Zipp	carpenter

Training personnel:

The following members attended a course or training in 1970:

R.P.D. Aggenbach	course photographic laboratory assistant
Th. Buisman	course welding and cooling technique
H.J. Boekel	course physical assistant

J.H. Oversluizen	course inland navigation
J. Kalf	course laboratory assistant
J. Hegeman	course 1st part analyst certificate
J.W. Rommets	course automation
P. Boer	3 months stage at the Zoöl. Museum of the University of Amsterdam.

Consultation group.

In the course of the year a consultation group was established by the personnel which, in consulation with the directors and if necessary with the Board of the Netherlands Zoological Society, will promote the interests of the personnel.

GENERAL SERVICE

In the course of the year the administration changed over to mechanical book-keeping. All data for the ledger, the administration of salaries, building accounts and stocks, as well as the budget are now mechanically administrated.

Library.

In the new rooms of the Transistorium the library accomodations were greatly superior to those in the old-buildings at Den Helder. All books are within easy reach and there is plenty of room for reading. Miss J. Starreveld left service as Mrs. Mulder-Starreveld and delegated the library-work to Mrs. v.d. Wal-Doornekamp. After some time Miss G. Witte was assigned as assistant. Before temporary help was given by Miss T. Kuiper and Miss S. Duinker.

DOMESTIC SERVICE

In the course of the year a number of architectoral and technical provisions have been made in order to enhance the efficiency of some laboratories and apparatus-rooms. The construction of a penthouse all around the windows of the building, to keep out excessive sunlight, was started.

It appears that it is not possible to sell the old building at Nieuwe Diep 27, Den Helder, since the Crown does not permit transfer of leasehold to a third party. This is due to the approaching raising of the harbour-dike when the building is to pulled down. Negotiations are in progress to let it for hire to the Fishery Cooperation for the remaining years. The former students' hotel has not been sold either.

Auxiliary departments.

The expanse of research departments in 1970 imposed a heavy burden on certain auxiliary departments, which in its turn entailed an expanse of these departments. Since in the near future further expanse of the instrumentaruim and its pertaining maintenance etc. is to be expected a number of auxiliary services were brought together into one instrumentation department with a special engineer at the head. The reorganization will have to be completed in 1970.

The following navigation programmes were completed.

Ephyra	166	navigation days
Eider	106	" "
Griend	76	" "
Willem Beukelsz	25	" " (on lease from R.I.V.O.)
Curlew	supplied 3700 tons of sea water	

On February 2nd the m.v. Eider was put into commission by Mrs Oversluizen-v.d. Beek, the wife of skipper J.H. Oversluizen.
The vessel was built especially for research on the tidal flats and inland waters and has given complete satisfaction.

On November 5th the shipyard "De Dageraad" at Woubrugge was awaited the contract for building the research-vessel for the North Sea. The time required is 12 months.

The acquisition of marine animals for scientific purposes amounted to f.14.231,48 for 1970. For f.39.743,55 was sold to schools, scientific institutes and institutions abroad.

Temporary guest-house.

The data for the temporary guest-house are as follows:

students	519	nights
guests	969	"
personnel	55	"
	1543	nights

New buildings.

In the course of 1970 further plans were developed for the future main building. It is expected that in another twelve months those plans will be completed.

Buildings in progress is going on according to plan. Completion date for the Experimental Aquarium is June 1971 and for the Guest-house May 1971.