



**NETHERLANDS
ZOOLOGICAL
SOCIETY**

**ZOOLOGICAL
STATION
DEN HELDER**

ANNUAL REPORT 1956

EER

Marine research in the Netherlands is carried out by the following Institutions:

Zoological Station of the Netherlands Zoological Society at Den Helder. Marine biological and hydrographical research. University extension work. Expenses paid by the State: Ministry of Education, Arts and Sciences.

Department for estuarine research (Delta-onderzoek) of the Hydrobiological Institution. Its task is to study the biological changes in the estuarine waters of the province of Zeeland, as well as their causes. These changes will be due to the closing of these waters in the near future. The Hydrobiological Institution itself (which is a fresh water station) is at Nieuwersluis (province of Utrecht), the Department for estuarine research is at Yerseke (province of Zeeland). The Institution (including its Department) is run by the Royal Netherlands Academy of Sciences at Amsterdam. The expenses are paid by the State: Ministry of Education, Arts and Sciences.

Government Institution for fisheries research at IJmuiden. Sea, coastal and inland fisheries. Fish preservation. Oyster research at Bergen-op-Zoom and, temporarily, at Wemeldinge for studies in connection with the closure of the estuaries in the province of Zeeland. Ministry of Agriculture and Fisheries.

Oceanographical Department of the Royal Netherlands Meteorological Institute at De Bilt (Utrecht). Physical oceanography and maritime meteorology. Ministry of Defense.

Hydrographical Department of the Navy. Office at the Hague. Bathymetrical surveys. Study of tides. Chart construction. Ministry of Defense, Dept. of the Navy.

Research Department of the Rijkswaterstaat. Headoffice at the Hague, research departments scattered. Current, tides, sedimentation, erosion, reclaiming of land. Ministry of Traffics and Waterways. The service of the Zuiderzee works, with office at the Hague, under whose direction reclamation of land in the Zuiderzee is organized, is under the junction of the same Ministry.

Geological Institute of the State University at Groningen. Marine geology.

ANNUAL REPORT
OF THE ZOOLOGICAL STATION OF THE
NETHERLANDS ZOOLOGICAL SOCIETY
FOR THE YEAR 1956

If we consider the work that has been done at Den Helder during the last decades, it appears that much time and effort has been devoted to the ecology of molluscs. In the beginning attention was mainly concentrated on the factors governing distribution or abundance after settling. Gradually, the trend of activity was more and more directed to larval ecology and the settling of the spat. This part of the research presents serious difficulties so that the results do not always correspond with the laborious efforts spent upon these items. Still, it seems worthwhile to proceed along this line and, especially, to find out in how far the larvae are active or passive with regard to their own conveyance. As a matter of fact, students again and again take an interest in this item. In 1956 it was Mr. J. W. F. NUBOER from Utrecht University, who continued previous attempts, especially to find out whether spat which are about to settle might prefer a certain degree of illumination and therefore a certain depth of water. He spent much time in technical preparations, and we hope the work will be continued in 1957.

Mr. DRAL resumed the investigations about the pumping and the straining of food in mussels, previously undertaken by him in 1952 under the supervision of Dr. TAMMES. This subject has reached a stage in which it becomes hard to make further progress. In the previous annual report it was explained that mussels can probably control the retention of food by regulating the position of the laterofrontal cilia. Now, Mr. DRAL wondered in what way the position of the abovementioned cilia could be changed. He was inclined to suppose that some minute muscles, which are known to exist in the filaments of the gills, could by relaxation alter the frontside of the filaments so as to give the laterofrontal cilia a different position, at the same time widening the ostia between the filaments, thus restricting retention. Hoping to demonstrate these changes in the filaments and the width of the ostia, Mr. DRAL administered adstringent and relaxing drugs. Subsequent

fixation and histological examination of the tissues did not, however, yield any evidence to support his views. This experience, as well as the difference in the action of the laterofrontal and lateral cilia, made it desirable to resort to the electron-microscope. To this end cooperation was established with the Laboratory for Electron-Microscopy at Leyden, where Mr. BRAAMS and his collaborators not only offered great help, but even took a personal interest in the subject. Mention should further be made of motion pictures made of the movement of the gill cilia. They form part of a film about the mussel and its culture. This film was made by Mr. WINDMEYER (Delft) by order of the Department of Fisheries. In a part of it also "University Film" (Utrecht) cooperated. The "Netherlands Educational Films" (The Hague) has also been helpful to us in making a motion picture of the feeding mechanism of the mussel. Apart from this, Mr. DRAL spent much time in working out data, collected earlier, on the influence of temperature and other factors on the pumping of mussels. We hope that Mr. DRAL's observations will appear in a paper in the Archives, possibly in 1959.

Mr. KRISTENSEN collected a number of observations on the effects of the severe and prolonged cold of the winter 1955/'56, which was, as might be expected, catastrophic to all sessile animals within the tidal area. On account of previous experience Mr. KRISTENSEN expected that during the following summer the depopulated areas would be densely populated by a new generation, but the density of spat of various molluscs, worms and crustaceans was below normal. This was probably due to the extremely low temperatures in the spring and the summer of this year.

Mr. KRISTENSEN further completed his investigations on the cockle by collecting some additional data. His work on this species comprises a 10 year period, and his thesis on the subject will soon appear in the "Archives". It is mainly about the influence of external factors on population density and growth of the species, but at the same time makes an important contribution to our knowledge of the fauna of the Wadden area.

In the above mentioned period Mr. KRISTENSEN also paid attention to several mollusc species of the North Sea. Some details of his observations will be given here.

The presence of a number of Atlantic species in the North Sea was notable in the post war period, especially during the warm season of 1947. It was discontinued during the last two years. The annual growth rate of these species, *Pecten maximus*, *Cardium crassum* and *Dosinia exoleta*, appeared to be quite normal, although the specimens lived near the boundary of their area of distribution here. The data of *Dosinia* were published in De Levende Natuur, 59, p. 82-84, 1956. An examination

of the shells of the razorclam, *Ensis siliqua*, revealed that the conspicuous difference in size of those washed ashore on the Dutch Westcoast and those washed ashore along the North Sea coast of the Wadden Islands, depends on their age. The specimens of the Dutch coast appear to have a life span of a few years only, with a maximum length of 14 cm, whereas ages of over ten years, with a length of 20 cm, were observed in the shells from the North Sea beaches of the Wadden Islands. Since *Ensis siliqua* is known to be susceptible to low temperatures, Mr. KRISTENSEN assumes that in winter the animals are more likely to die along the shallow Dutch West coast than in the deeper waters north of the Wadden Islands. The data in question were published in *De Levende Natuur*, **60**, p. 93-95, 1957.

The work on the common cuttle, *Sepia officinalis*, initiated by Miss GEHRELS in 1955, was taken up again by Mr. H. L. DE BEAUFORT, of Utrecht University. In the previous report mention has already been made of our intention to trace the influence of several factors that will make *Sepia* develop a certain colour pattern. Miss GEHRELS' experiments, inspired by work of HOLMES (*Proc. Zool. Soc. London*, **110**, p. 17-35, 1940), had shown that the presence of white in the surroundings of the cuttle will stimulate the animal's inclination to display a characteristic white patch on its back. It was Miss GEHRELS' opinion that yellow would also exert a significant influence, even more than white. This might indicate that the quality of the light plays a part in causing a reaction. The experiments of Mr. DE BEAUFORT have shown, however, that it is rather the quantity of light that is decisive for its effect on *Sepia*. The experiments will perhaps be continued in the near future. If not, they will be published in the Archives.

Mr. R. NIEUWENHUYIS, from the Central Institute for Brain Research, Amsterdam, stayed at Den Helder for some time, in order to make preparations of the so called cauda equina of several kinds of fishes. Mr. NIEUWENHUYIS is especially interested in the functional side of the matter.

Mr. R. J. VAN BIEZEN, of the University of Amsterdam, made, by mutual arrangement with Prof. J. TEN CATE and Dr. A. PUNT, an effort to estimate the influence of temperature on the osmotic pressure of the blood of *Carcinus maenas*, using the method of freezing point determination. Mr. VAN BIEZEN had to cope with many technical difficulties, however, so that no results were obtained.

Miss A. J. WARBURG, of Groningen University, decided to choose a subject of research that had for many years been recommended at Den Helder, but until then nobody had chosen it. The slug *Aeolidia papillosa* is known greatly to prefer the sea anemones *Metridium senile* and *Actinia equina* for its food, but there are indications that other

species of anemones are occasionally taken as well. Some observations suggested the possibility that the preference for a certain anemone might not be innate, but acquired in the prime of life. In fact, it was supposed that the newly hatched young slug could perhaps be conditioned to *Diadumene cincta*, with the result that a population would come into being living on *Diadumene cincta*, in spite of the fact that the slug species as a whole does not feel attracted to this anemone. Contrary to our expectations Miss WARBURG found that, apparently, all individuals of *Aeolidia papillosa* accept *Diadumene cincta*, but if given the choice between *Metridium* and *Diadumene* the relation in which both are taken is about 7:1. No individuals were found wholly to refuse *Diadumene*. Spawn of slugs that had been shown to prefer *Metridium* to *Diadumene* was now placed in aquaria with *Diadumene*, in the hope that the young animals, after larval life, would feed on *Diadumene*, and later on give young ones that would prefer *Diadumene* to *Metridium*. The crucial point in these experiments was whether the spat could be kept alive through metamorphosis. *Aeolidia papillosa* is believed to possess a short larval life. It was found, however, that the larval life of this species is less short than it is supposed to be and Miss WARBURG did not succeed in rearing the larvae through metamorphosis. We hope that the subject will be taken up again later on.

Mr. DE BLOK, commissioned by the Netherlands Organization for Pure Research, continued his work concerning lunar and tidal influences on the reproductive rhythm of marine animals. Throughout the year 1956 he has been busy in bringing his complex apparatus into working condition. We hope the influence of several factors, e.g. light, pressure, and so on, can now be studied separately with this installation. Since his program of work has already been mentioned in the previous report, it is not going to be discussed this time. Mention should, however, be made of the fact that L. HAUENSCHILD, Tübingen (Naturwissenschaften, **43**, p. 361-363, 1956) has succeeded in demonstrating that the reproductive rhythm in *Platynereis Dumerilii* is regulated by the period of illumination. He has succeeded in imposing a certain rhythm upon the animals by submitting them to different periods of illumination.

Mr. F. CREUTZBERG, also commissioned by the Organization for Pure Research, continued his research on the orientation of migrating eels. In last year's report it was already explained that his work comprises observations at sea as well as experiments in the laboratory. For these experiments a staging had been constructed on the top of the roof of the Zoological Station; it will enable Mr. CREUTZBERG to find out whether elvers use the sun for orientation. Birds are known to find their way with the help of the sun, but in the case of eels this is still

quite uncertain. Apart from this, observations were made on board of two of the Dutch lightvessels. Regular hauls with nets of coarse plankton gauze have shown that the first appearance of elvers and their subsequent increase in numbers occurs at about the same time off the Belgian coast and near Den Helder. No clue was obtained to ascertain whether the majority reach the Netherlands by passing the Straits of Dover or by rounding the Shetlands, and from the time of migration no conclusions could be drawn as to their passivity or activity during their transport. In another respect, however, the observations did yield important evidence. It had previously been taken for granted that the elvers would only enter the North Sea if the temperature exceeded a certain critical value, but during the period of severe cold they were caught in increasing numbers at water temperatures below zero. The catches have also shown that at night the elvers are found in greater numbers near the surface during flood tide than during ebb tide. Mr. CREUTZBERG also made some cruises on the Wadden Sea, by night towing a coarse plankton net just below the surface, with the current or facing it. Here, too, the numbers caught during the flood were much greater than those caught during the ebb. Hauls of equal duration, however, if made during one and the same tide, yielded equal catches, irrespective of the direction in which the hauls were made. The transport therefore appears to be fully passive, but it takes place during flood only, and, at least near the surface, not during ebb. The observations give an interesting outlook and this line of research will be carried on in 1957.

Mr. WESTENBERG continued to develop his theoretical considerations on population systems. His contribution to the summer course was published in *Vakblad voor Biologen* (36, p. 41-53, 1956). The difference between the structure of the parasite-host relation and predator-prey relation, which was touched upon in this paper, was further discussed in a lecture delivered at a meeting of the ecological section of the Netherlands Zoological Society at Utrecht. On this occasion he also demonstrated that it is not self-evident to introduce constant environmental conditions in a population model.

Mr. KRISTENSEN continued his observations on migratory species by buying up specimens from the fishermen. The year 1956 brought a late, but severe winter; spring and summer were cold as well, whereas the remaining months were rather warm.

The low temperatures of the spring of this year delayed by 2 or 3 weeks the arrival of southern migrants that usually reach our neighbourhood in April and May. With some species this even resulted in an area of distribution different from the normal one. *Sepia* normally has its north boundary near Den Helder, but in 1956 the species

Species	Sex; Size (cm)	Locality (ST means buoy on the Silverpit- Texel-route)
MIGRANTS SUPPOSED TO HAVE ENTERED THE NORTH SEA VIA DOVER STRAIT		
<i>Cetorhinus maximus</i>	♂ 377	Wadden Sea
<i>Torpedo marmorata</i>	♀ 50	15 km E of ST 3 buoy
<i>Raia brachyura</i>	♀ 94	Black Bank
<i>Raia montagui</i>	33-64	Texel Hole-ST2- N. of Terschelling
<i>Spondyliosoma cantharus</i>	33	near ST 4 buoy
<i>Trigla cuculus</i>	21-33	off Texel, and Black Bank
<i>Trigla lineata</i>	24; 31	Black Bank; ST 3 buoy
<i>Sepia officinalis</i>	9-23	mostly from coastal waters and Wadden Sea
<i>Octopus vulgaris</i>		Texel Hole area-N of Terschelling, 40-45 m
MIGRANTS SUPPOSED TO HAVE ENTERED THE NORTH SEA VIA THE NORTHERN ENTRANCE		
<i>Scomberesox saurus</i>	37; ♀ 37	stranded near Den Helder
<i>Brama raii</i>	55; 47; ♂ 50; ♀ 51; 50; 45; 45; 53	nos. 2 & 3: 58° 40' N 3° 20' E; no. 8: off Callantsoog, 9 m; the others stranded between Katwijk and Texel
<i>Mola mola</i>	± 85; ± 75; ± 100	stranded between Egmond and Frisian coast
NORTHERN SPECIES, RARE IN THE S. NORTH SEA		
<i>Gadus poutassou</i>	± 22	W. of Texel, 9 m
<i>Onos cimbrius</i>	± 12	off Callantsoog, 9 m
<i>Anarhichas lupus</i>	29- ± 50	W of Den Helder-N of Terschelling, 28-38 m
<i>Eledone cirrhosa</i>		Texel Hole; N of Terschelling
SPECIES, WHOSE DIRECTION OF MIGRATION IS UNCERTAIN		
<i>Petromyzon marinus</i>	± 65	Wadden Sea
<i>Acipenser sturio</i>	± 150; ± 250	near LV Terschellingerbank; Wadden Sea
<i>Raniceps raninus</i>	7; 8; 8; 8; 6	near Den Helder, 10-20 m
<i>Spinachia spinachia</i>		Harbour of Den Helder
<i>Scorpaena dactyloptera</i>	± 15; 17	E of ST 3 buoy; Pit 3 buoy
<i>Labrus berggylta</i>		off Petten, 21 m
<i>Todarodes sagittatus</i>	24	stranded near Den Helder
<i>Illex illecebrosus</i>		Texel Hole, 35 m

Numbers per month

J	F	M	A	M	J	J	A	S	O	N	D
—	—	—	—	1	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	1	—	—
—	—	1	—	—	—	—	—	—	—	—	—
5	1	—	—	1	2	—	—	5	6	5	—
—	—	—	—	—	—	—	—	1	—	—	—
—	—	—	—	2	9	2	1	—	—	—	—
—	—	—	—	—	1	—	1	—	—	—	—
—	—	—	—	2	21	19	3	—	7	1	—
3	—	—	—	—	—	—	—	—	—	—	4
1	—	—	—	—	—	—	—	—	—	—	1
2	2	—	—	—	—	—	—	—	—	—	4
—	—	—	—	—	—	—	—	—	—	—	3
—	1	—	—	—	—	—	—	—	—	—	—
—	—	—	1	—	—	—	—	—	—	—	—
—	1	5	3	3	—	—	—	—	—	—	—
—	—	1	—	—	—	—	—	—	—	—	1
—	—	—	—	1	—	—	—	—	—	—	—
—	1	—	—	—	—	—	1	—	—	—	—
1	—	—	3	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	1	—	—
—	—	1	1	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	1	—	—
—	—	—	—	1	—	—	—	—	—	—	—
—	—	—	—	—	1	—	—	—	—	—	—

scarcely reached us, and remained in the estuarine area of the province of Zeeland. Other southern migrants, too, were strikingly scarce near Den Helder in the first part of the summer. This applies to *Loligo vulgaris*, the rays *Raia brachyura* and *R. montagui*, the pilchard (*Clupea pilchardus*), the dory (*Zeus faber*), the red mullet (*Mullus surmuletus*) and to the black bream (*Spondylusoma cantharus*). Only the stingray (*Trygon pastinaca*), which is also a migrant from the South, but usually arrives late in the season, was fairly numerous in 1956.

The migrants that as a rule pass Den Helder in November–December, when the cold of winter sets in, were exceptionally late in 1956. This was, no doubt, due to the mild weather. *Mustelus vulgaris* and *Octopus vulgaris* made their appearance later in December, and the main crowd of *Scylliorhinus canicula* and *Raia montagui* did not arrive until January, 1957, which is quite unusual.

It struck Mr. KRISTENSEN in 1956 that the stranding of live specimens of oceanic species, e.g. the saury pike (*Scomberesox saurus*) and the bream (*Brama raii*), seemed to have another cause than had hitherto been supposed. Mr. VERWEY had always assumed that these species would strand alive because of their inability to determine the depth of water, which would prevent them from regaining deep water once they found themselves in the shallower water near the coast. Mr. KRISTENSEN now thinks that stranding may to a great extent be brought about by low temperature and violent commotion of the water in stormy weather. This supposition (De Levende Natuur, **59**, p. 59–64, 1956) was partly derived from the behaviour of tropical fish, which will show desorientation if irritated by low temperature, partly from the fact that stranding often occurs during stormy weather. The data may indicate that coordination of sensory impressions is hampered by low temperatures.

A list of migrants and of some other specimens landed in 1956 is added to this report as usual. Special mention be made of a female electric ray (*Torpedo marmorata*) that was caught northwest of Terschelling in September. It is a southern species, which reaches the North Sea only by way of exception. Four specimens have now been reported in all; a short article on the subject appeared in De Levende Natuur, **60**, p. 39–41, 1957.

Mr. KRISTENSEN also gave special attention to the silverside (*Atherina presbyter*) and to the occurrence of the Zuiderzee herring near Den Helder.

Hitherto little was known of the silverside in our country. Thanks to the help of Mr. G. J. DE HAAN, Texel, it was now ascertained that the species spawns in brackish water on the island of Texel in June and July. The fingerlings disappear when about 5 cm long, and return the next year when they are 7–13 cm long. Just as the anchovy, to which

the silverside greatly resembles in migration and distribution, the majority of the spawners are one year old, only a few are longer (about 16 cm) and two years old. On this species Mr. KRISTENSEN also published a short paper (De Levende Natuur, **60**, p. 159-162, 1957).

Herrings with the characteristics of the former Zuiderzeeherring gradually disappeared after the closure of the Zuiderzee, between 1932 and about 1940. In 1956 it appeared that such herrings were still caught in the brackish water of the North Holland Canal. In the months of April and May Mr. KRISTENSEN managed to get hold of some 20 specimens. According to the fishermen he bought them from they had all characteristics typical of the former Zuiderzee herring. This was confirmed by Mr. J. ZIJLSTRA, IJmuiden, who found that the numbers of vertebrae agreed with those of the Zuiderzee variety and not with those of the North Sea herring. The herrings in question probably belong to the populations of the Eems, the Jade or the Elbe, where spring spawning herrings maintained themselves in the brackish waters.

The grey seal (*Halichoerus grypus*) already mentioned in the previous report was repeatedly seen during the first half of the year 1956. Since the animal was by no means shy it may have come from the protected colony of the Farne Islands, some 400 km northwest of Den Helder. The observations were taken down by Mr. KRISTENSEN (De Levende Natuur, **60**, p. 62-63, 1957).

Mr. VERWEY gave much time to the interpretation of the literature on the vertical movements of plankton animals as a result of work done at Den Helder. He delivered a lecture on the subject at the meeting of the Society of April 21st. He also gave a survey of our present knowledge of the influence of temperature on the osmoregulation of crustaceans, which may be useful in designing future work. He read a paper on this subject during the Colloque internationale de biologie marine, held at Roscoff in June (Ann. biologiques, **33**, p. 129-149, 1957). Mr. VERWEY also gave an account of the organization of marine biological research (Rapporten Kon. Ned. Akad. van Wetenschappen, **8**, p. 1-16, 1956). Finally, mention should be made of an evaluation of the numbers of birds present in the Wadden area during the severe cold in the month of February (Ardea, **44**, p. 218-224, 1956). The estimates were made by Mr. KRISTENSEN and Mr. VERWEY from a plane that was placed at their disposal by the Royal Navy at the request of the Committee for Birdfeeding in Winter.

The hydrographic investigations, under the direction of Mr. POSTMA, had all the benefit of Mr. DUURSMA's appointment. On March 1st Mr. DUURSMA, a chemist in the service of the Netherlands Organization for Pure Research, started a study on the quantity of dissolved organic

matter in the sea. The amount of this material many times exceeds the quantity of organic matter present in plankton and organic detritus. Nevertheless, its concentration is so low that considerable difficulties are encountered if one tries to obtain accurate determinations. As a result only relatively few estimates have as yet been made.

The activities of Mr. DUURSMA were in the first place directed to the development of an accurate method of analysis. The principle of the original carbon-determination of KROGH, which was modified by KAY, is the oxidation of organic carbon to carbon dioxide, followed by a titration of the latter compound. Mr. DUURSMA has substituted this titration by the so-called coulometric determination, which is used for the determination of carbon in steel. It may already be stated that the latter method has many advantages to the method of titration. Besides carbon, the nitrogen-content of the dissolved matter will also be determined. It is to be expected that the C:N - ratio will give indications about the character of the material in question.

Mr. POSTMA continued his investigations on the influence of Wadden Sea water in the North Sea, already mentioned in the previous annual report. Continuing research work carried out at Den Helder in 1954 by Prof. J. KREY of Kiel University, Mr. Postma tried to obtain insight into the ratio of chlorophyll in living and dead phytoplankton. This investigation is a continuation of the work on productivity, which has been going on for a number of years. In this connection it was a fortunate circumstance that Prof. E. G. STEEMANN NIELSEN, Copenhagen, in August passed a week at Den Helder, where he carried out a number of measurements of organic productivity by means of his C^{14} method.

Mr. POSTMA also spent much time on working out the chemical data of the "Snellius"-expedition; in September he delivered a short lecture on the results of this investigation for an assembly of German geophysicists at Hamburg.

Mr. BEKE's work concerning the chemical composition of suspended non-organic matter in the Waddensea came to a temporary stop by the reconstruction of the chemical laboratory in the second half of 1956. However, Mr. BEKE spent much time in assisting Mr. DUURSMA. The work on suspended matter will be continued in the future.

In the 1955-report the work of Mr. EVERHARDUS, a pupil of Prof. GROEN, De Bilt, was mentioned. Mr. EVERHARDUS investigated the movement of tide-rips in the Wadden Sea. His results are partly a confirmation of facts previously found, partly they give us better insight into the formation and disappearance of these boundaries of water masses. However, to obtain a more satisfactory insight, these investigations should also be continued.

In addition to the above mentioned activities, Mr. I. J. HERMANS,

Amsterdam, worked for three months at Den Helder. His work there preceded his appointment as a biologist at the Caribbean Marine Biological Institute, Curaçao, and with a view to his future task he intended to get familiar with the cultivation of plankton and molluscs.

A satisfactory collaboration has been maintained with various public agencies, which either gave their help or called in the aid of the Zoological Station. They are not mentioned separately, except the Pilotage and its Commissioner at Den Helder and the crews of two of the lightships, to whom we owe many thanks for their cooperation.

The summer courses were delivered by all the members of the staff just as in previous years. The number of attending students amounted to 36, 15 of whom came from Groningen, 1 from Utrecht, 2 from Amsterdam and 19 from Leyden.

Moreover, a special physiological course was organized by the University of Amsterdam for 20 of its students under the direction of Messrs. PUNT, VAN NIEUWENHOVEN, KUCHLEIN and PARMA. Another course for 34 younger students from Utrecht was organized by Mr. KIPP and his assistants.

The total number of man-days for individual workers and summer course participants at the Zoological Station in 1956 exceeded 1200. In the period 1947-'56 it averages about 1120.

The following foreigners visited the Zoological Station in 1956: R. H. BAIRD, Conway, Wales; Theodore H. BULLOCK, Los Angeles, California; Robert S. DIETZ and wife, Office of Naval Research U. S. Navy, London; D. C. GEYSKES, Paramaribo, Surinam; F. VAN HARREVELD and wife, Pasadena, California; P. C. HENRIQUEZ, Willemstad, Curaçao; Arthur D. HASLER, Madison, Wisconsin; H. KLEEREKOPER and wife, Hamilton, Ontario (Canada); C. LAD PROSSER, Urbana, Illinois; E. STEEMANN NIELSEN and wife, Copenhagen, Denmark; C. A. G. WIERSMA and wife, Pasadena, California.

The building has again undergone various improvements. By the end of 1955 the Ministry of Education, Arts and Sciences set *f* 21 000.—apart for this purpose. This sum was used for a modernisation of the chemical laboratory, an extension of the seawater pipings in the course room, the construction of fixed tables in the course room and in one of the students' rooms, the building of cabinets for storing supply specimens and for the faunistic museum collection, and, finally, a colovinyl covering of the wooden floors. Moreover, a lightning-conductor was put up on the roof of the building, a cellar was made for a heavy compressor, and a bicycle shed was built.

Even the students' lodge "Potvis" was rather expensive this year as the roof needed a new rubberoid covering.

A considerable extension was given to experimental equipment.

Grants from the Netherlands Organization for Pure Research made the construction of a pressure chamber and the experimental installation for the work of Mr. DE BLOK possible, the control mechanism for his experiments was completed, a heavy compressor and a motor unit were installed and plastic pipings were laid on. These acquisitions required about *f* 28 000.— from the Organization for Pure Research and some thousands from the normal budget.

Mr. DUURSMa's work was also rather expensive. The above mentioned apparatus for coulometric nitrogen determination cost about *f* 1 600.—, but in addition to this more than *f* 1 000.— was spent on the completion of this apparatus and on some glassware. Moreover, a Beckman pH-meter was bought at the price of *f* 1 675.—. Another *f* 1 500.— was contributed to the compressor, so that the budget for instruments showed a total sum of *f* 6 500.—. This amount could only be paid because there was still some money left from former payments by the "Shell"-concern and by "Waterstaat".

The library, especially the section for periodicals, is cramped for space, but the library itself is in an excellent condition. The available budget, which is low, was largely exceeded, and we hope that in future years this amount may be a little increased. A special sum enabled the purchase of a series of 50 volumes of the Swedish periodical "Fauna och Flora" and four volumes of the journal "Deep Sea Research". Other series were completed and the exchange programme was carried on and extended.

The skipper, J. H. OVERSLUIZEN, kept the Station's vessel "Max Weber" in good repair, but by the end of the year severe difficulties had to be faced. Upon reviewing the motor the naval inspector demanded replacement of the cylinders. When this had been done, the engine block began to show cracks, and as this type of engine is obsolete, the block had to be cast to order. So the ship could not be used from September 1956 till March 1957, and the costs of these repairs amounted to about *f* 5 500.—, which, we hope, will be refunded by the Government.

The Station's supply with seawater has been a matter of special concern for many years. Formerly, the water had been pumped up from the surface of the Nieuwediep during flood tide. When the south end of the Nieuwediep was dammed off in 1951 the harbour was no longer under the influence of tidal currents. From this time on the quality of the water in the harbour Nieuwediep became bad in summer and a water boat had to be used to transport water from the Marsdiep, the inlet of Texel. In winter the water of the harbour could still be used when pumped up from near the bottom. By 1956 the situation had grown worse by silting to such a degree that the Station had to rely

fully on transportation of water by boat. In this way excellent water, of a higher salinity than formerly, was provided.

There were some changes in the staff during the year 1956. In the first place there was the departure of Mr. KRISTENSEN, who joined the staff of the Physiological Laboratory of the University of Amsterdam on November 1st. From 1946 onward he had been at the Zoological Station and he had devoted himself to his task with great enthusiasm. The loss of his faunistical and ecological knowledge will be deeply felt for the next few years. Above all things he was always of great help with the courses, and he was very good in supplying the Universities with animals. Mr. W. H. DUDOK VAN HEEL from Utrecht was appointed in his place and entered upon his duties on November 15.

In June Mr. J. H. OVERSLUIZEN was given the combined job of skipper, motordriver and handiman. These functions cannot easily be combined and we hope that this situation will soon be altered. The former combination of caretaker and skipper was no longer kept up. At present Mr. BEKE, a chemical analyst, is living in the building. By means of this measure two garrets became vacant, which was a piece of good luck, as a shortage of space is gradually being felt.

Miss G. WATTIEN, a student-analyst, chose another career on September 1st. Her place was taken by Mr. THEO DE VRIES. Finally, we are sorry to state that the charwoman Mrs. D. FERNHOUT-GLAS left the Station on December 15th after having been in our service for more than six years.

Thanks to a grant given by the Netherlands Organization for Pure Research Mr. E. K. DUURSMA could commence his activities on March 1st.

It should be mentioned that Mr. POSTMA paid a short visit to Norway with the purpose of making investigations in the fjords under the auspices of the Shell-concern. On this occasion he visited Prof. BRATTSTRÖM at Bergen, Prof. BRAARUD at Oslo and Prof. KULLENBERG at Göteborg. In September Mr. POSTMA attended the conference of the Assembly of geophysicists at Hamburg.

Mr. VERWEY joined the Colloque internationale de biologie marine, which was held at Roscoff in June. His holidays in September were devoted to visits to the marine biological laboratories at Arcachon, Concarneau, Dinard and Luc-sur-Mer and the fisheries laboratories at La Tremblade, La Rochelle and Boulogne-sur-Mer, as well as to the laboratory of the Centre de Recherches et d'Etudes océanographiques at La Rochelle. This was undertaken to get an impression of the organization of marine biological research in France.

The supply of study materials amounted to f 5 911.70. The purchase of animal specimens cost f 2 954.59 and expenditure for preserving

solutions, wicker-bottles and packings was *f* 1 174.29. This resulted in a surplus of *f* 1 781.82, which exceeded the profit of previous years. The low sum for purchases of specimens was partly due to the fact that sharks were only landed in small numbers this year.

The expenses for 1956 were *f* 117 786.68. The estimated amount was *f* 114 300.—, so that there is a deficit of *f* 3 486.68. We hope the Government will decide to refund this deficit. Of the amount of *f* 117 786.68 *f* 93 790.26 was spent on salaries and national insurance and *f* 23 996.42 on the actual exploitation. In fact, expenses have been much greater because of the grants from the Organization for Pure Research. Moreover, the Government settles pension payments directly with the National Pension Fund. The total expenses may have exceeded *f* 150 000.—.

Den Helder, February 1957
J. Verwey

The Netherlands Zoological Society has issued the following publications, which are obtainable from the Director of the Zoological Station, Den Helder, at the prices given below:

Tijdschrift van de Nederlandse Dierkundige Vereniging

Series I, vols 1—7, 1874—1885, out of print	
„ II, „ 1—20, 1887—1927, partly out of print . .	8,50*
„ III, „ 1—3, 1928—1933, partly out of print . .	5.—
Supplement to vol. 1 (Ser. I), 1883—'84:	
Report on oyster research	6.—
Supplement to vol. 2 (Ser. I), 1888:	
Report on certain fisheries	6.—
Index to Tijdschrift, 1874—1909	1.20

Archives Néerlandaises de Zoologie, issued in cooperation with the Holland Society of Sciences at Haarlem:

Vols. 1—7, 1934—1947	22.—
„ 8, 1947—1951	25.—
„ 9—13, 1948—1958	30.—
Suppl. to vol. 3, 1938	10.—
„ „ „ 7, 1946	2.—
„ I, „ „ 10, 1953	8.50
„ II, „ „ 10, 1953	8.50
„ I, „ „ 13, 1958	40.—

Flora and Fauna of the Zuiderzee. In Dutch. 4°. 460 pages, 1922.
Out of print.

Supplement to Flora and fauna of the Zuiderzee.

In Dutch. 4°. 258 pages, 1936 7.—

Changes in the flora and fauna of the Zuiderzee since its closure in 1932. In Dutch, with English summary. 4°. 359 pages, 40 figures, 11 plates and many maps and tables, 1954 . . 15.—

De Biologie van de Zuiderzee tijdens haar drooglegging,

parts 1-6, 1928-1944 Per set 10.—
Per part 2.—

Mededelingen Commissie faunistisch onderzoek Zuiderzeepolders,

parts 1-2, 1949 Per set 1.50

Catalogue of the Society's library. 1907. 1924. Out of print.

*) Prices in Dutch guilders per volume, reduced prices for members.
Postage extra.

