

S h e l l f i s h a n d B e n t h o s C o m m i t t e e

By A.C. SIMPSON

1968

MOLLUSCA AND BENTHOS

Belgium

(E. Leloup)

Mytilus edulis

Observations have been made on the biology of the mussels in the "bassin de chasse" at Ostende. Observations have been continued on the distribution of Mytilicola along the coast of Belgium.

Ostrea edulis

Observations on the biology of the oyster in the "bassin de chasse" at Ostende have been continued.

Canada

(D.G. Wilder)

Crassostrea virginica

Commercially applicable methods of producing seed oysters under controlled hatchery conditions and in the field have been developed and shown to be biologically feasible.

Pasteurization is advantageous in preparing media for the mass culture of flagellates for feeding larval molluscs. Several species of flagellates have been adapted to growth in natural sunlight and a simple culture apparatus has been developed.

Selective breeding has been started in an attempt to produce oysters superior in growth, disease resistance and possibly other characteristics.

Natural spatfall near Ellerslie (Prince Edward Island) was heavy in late July and early August (warm, dry) but growth and survival later in August (cold, wet) were poor. Slow growth, silting and fouling were major factors in mortality. The planting of spawning stock in barren, early spawning areas seems important in supplying breeding potential.

The rearing of oysters on suspended strings of scallop shells to sizes suitable for planting shows great commercial promise for hatchery and natural production.

Total mortalities over 3 years of adult (11 cm) and seed oysters (6 cm) transplanted to the west coast of Newfoundland were 58% and 5% respectively. Meat condition was best in July but generally poorer than in good oyster areas. Spawning occurred in 1967 and 1968 at least.

Placopecten magellanicus

Exposure of scallops to direct sunlight for 2 and 4 hours at 21°C caused 50 and 100% mortalities respectively. An experimental hooded drag designed to catch scallops that swim over the drag proper was constructed and tested. Studies of byssus attachment were conducted for two stocks of scallops that differ in swimming behaviour. A system for determining the density of scallops from a submersible was developed. High density ($>3/m^2$) scallop patches from 200 to 1,000 m across were found on sandy bottom. These patches were interspersed with muddy areas where there was less than 0.1 scallop/ m^2 .

Studies of scallops in Port au Port Bay, Newfoundland, show concentrations of 1.3 to 4.0/m² and suggest that the beds have recovered enough from over-fishing to support a small fishery. Age at maturity is estimated at 1.5 to 2 years. Spawning occurs from June to fall.

Cephalopoda

The 1968 fishery for Illex illecebrosus in Newfoundland was a complete failure but an otter trawl survey from Cape Cod to Cape Hatteras in August-September produced large quantities. Biological studies of these populations are being continued. A study of the systematics and biology of squids (Rossia spp.) off northern North America was completed.

(Canada: Benthos see page 8)

Finland

(S.G. Segerstråle)

Benthos

Quantitative sampling of benthos in the Gulf of Finland and the Gulf of Bothnia has been undertaken as part of the long-term census planned by the Institute of Marine Research and the Finnish section of the I.B.P.

Investigations have been made on the following species: species of Nematoda (taxonomy and ecology), Harmothoe sarsi (biology), species of Chironomida (taxonomy and ecology), Pontoporeia affinis (reproduction), Mesidotea entomon (biology), Mysis mixta (reproduction), Crangon crangon (biology), Mytilus edulis, Mya arenaria, Cardium lamarcki, and Macoma baltica (reproduction).

France

(L. Marteil)

Huîtres

En dehors des recherches sur le développement de la conchyliculture en France, les travaux ont porté sur les relations existant entre certaines mortalités soudaines constatées, en période estivale, et les déséquilibres du milieu dans quelques estuaires, par suite notamment de la prolifération des germes libérant de l'hydrogène sulfuré.

Une grande attention a été portée à la "maladie des branchies" qui frappe essentiellement C. angulata. La distribution géographique de cette affection, son évolution et ses conséquences ont été précisées. A l'occasion de la recherche des causes de cette épizootie, deux organismes ont été mis en évidence. L'un s'apparente à D. marinum, l'autre à un protiste Labyrinthulidé.

Pecten maximus

L'étude de la composition en taille et par âge des diverses populations de P. maximus a montré que le nombre d'individus âgés a beaucoup diminué par suite d'une exploitation trop intensive.

Germany

(K. Tiews)

Mytilus edulis

Routine investigations on the growth and quality of wild and cultured mussels and on their infection rate with Mytilicola intestinalis have been continued at the 'Institut für Küsten- und Binnenfischerei'.

Benthos

The Biological Station, Heligoland, continued its sampling of benthic communities on special stations in the North Sea with the aim to study changes in species distribution and dynamic aspects of the echo-system.

The 'Institut für Meeresforschung' at Bremerhaven has continued its study on the distribution of microbenthos in the southern North Sea with special emphasis on nematodes, fungi and bacteria.

The 'Institut für Küsten- und Binnenfischerei' continued benthos sampling in the southern Baltic during a research cruise of F.R.V. "Anton Dohrn" in April/May 1968.

The development of benthos communities was studied in a brackish water pond at the 'Institut für Küsten- und Binnenfischerei'. The distribution of benthic food species for flat-fish was studied along the German North Sea coast.

Iceland

(U. Skúladóttir)

Mytilus edulis

Age-determination, growth and maturity studies have been continued. A size/shore level gradient has been observed, the mussels being distinctly larger at lower shore levels. Commercially sized mussels of 60 mm have been estimated to be 5-6 years old.

Experiments with the cultivation of mussels on ropes suspended from rafts are being prepared.

Ireland

(F.A. Gibson)

Mytilus edulis

A large number of inlets on all coasts were surveyed for their mussel stocks or potential. These surveys drew attention to industrial pollution starting to show effects on the fauna.

Experiments with raft culture of mussels in Castlemaine Harbour (Co.Kerry) were very encouraging.

Ostrea edulis

The spawning of oysters and particularly the migrations of oyster larvae in Tralee Bay were studied. The summer of 1968, being one of the best for larval survival for many years, provided a good opportunity for studying the water flow in Tralee Bay, and the relationship of this to larval movement and settlement. Experiments were carried out to discover suitable spat settling surfaces and particularly good settlement was obtained using a new type of bottom collector. The spatting season of 1968 was probably the best on record.

Oyster work of a similar kind was also carried out at Clarinbridge (Co. Galway). In this area the spatfall was not particularly high.

Pecten maximus

Research into the biology and distribution of this species was recommenced in 1968. Particular attention was paid to the age and size distribution of the catch as related to fishing effort.

Netherlands

(P. Korringa)

Oysters

Since the number of native oysters is still very small in the Oosterschelde, due to the effect of the long winter 1962-1963, the oyster industry depended again on the importation of seed oysters from other countries.

There was considerable concern about defects observed in the gills of flat and Portuguese oysters in France, tentatively ascribed to a contagious disease. It was impossible to prevent completely oyster showing these symptoms coming to the Dutch waters, for some of the Portuguese oysters relaid in the Oosterschelde in 1967 showed traces of gill defects. Moreover, complete prohibition of import of seed oysters would mean bringing the oyster industry to a virtual standstill. Many samples have been analysed and permission was given to import oysters from Brittany (flat oysters), the Sado (Portuguese oysters) and the Adriatic (flat oysters).

Though a slight aggravation of the symptoms was observed in the course of 1968 and mortality was somewhat higher than the year before, the overall situation was satisfactory. There was no question of an alarming outbreak of the gill disease (if it really is a disease) in the Netherlands waters.

In winter and early spring hydrographical observations have been made on the influx of Rhine water in the Oosterschelde. Oystermen and lobster merchants were given notice when a spell of low salinities was to be expected.

Mussels

A start was made with a study of hydrographical and biological conditions in the vicinity of the oyster plots in the western Waddenzee. The new laboratory for studies related to the mussel industry was built in the course of 1968 and the technical installation will be completed during 1969.

A survey was made on the distribution of Mytilicola in the eastern section of the Waddenzee.

Norway

(K.R. Gundersen)

Chlamys islandica

During a survey in September, numerous beds were found in the Bear Island - Hopen area, especially in 80-120 m south-east and south of Bear Island. In a five minutes' haul with a three-foot Baird mussel dredge up to 250 scallops, mostly 6-10 cm across, were taken. Bottom conditions were very rough, causing frequent gear damage.

Mytilus edulis

Experiments with raft culture were continued. Due to heavy spatfall the collector ropes were often crowded with mussel seed. Thinning was effected by transferring the seed to cylindrical "stockings", 2-5 m in length, made from flexible net of nylon fibres. In a few days the mussels penetrated the meshes, attaching themselves to the outer side of the net. The diameter of the stockings was scaled in relation to the size of the mussel seed, with the aim of obtaining an optimum quantity of about 15 kg per m. Mussels, 30 mm long, transferred to stockings in March, had grown to approximately 60 mm in October.

The period of spatfall was studied in the Oslofjord and Bergen area by placing plates of foam plastic in the sea at fixed time intervals.

Laboratory experiments for a study of the influence of salinity on the growth of mussels have been initiated.

A programme based on co-operation with a large number of private persons for mussel culture experiments has been started.

Poland
(L. Zmudziński)

Miscellaneous

Observations were made on the taxonomy, morphometry and ecology of commercial species of molluscs, obtained during a summer and autumn cruise off the north-west coast of Africa.

Benthos

Southern Baltic: Bottom fauna samples were collected at 110 stations in the area east of 12°45'E and south of 56°N during a summer cruise. The bottom fauna was also investigated in the deepest parts of Arkona, Bornholm and Gdańsk Deep in each season. Also the shore and shallow water fauna from the sandy regions was investigated. On the basis of material from 1967 a chart of the bottom fauna in the southern Baltic has been prepared.

The detailed morphology of juvenile specimens of various Gammarus species, and the biology of the prawn Palaemon adspersus were also investigated.

North Sea: During an autumn cruise in the north-west part of the North Sea, bottom fauna samples were collected. Harpacticoida in material collected in the years 1966-1967 from Norwegian waters were investigated.

Portugal
(H. Vilela)

Crassostrea angulata

Studies on the condition and the gill disease of oysters were continued.

Sweden
(B. Dybern)

Ostrea edulis

The survey of the Swedish fishery for oysters has been continued.

Cephalopoda

A survey has been made of the fishery for cephalopods.

United Kingdom
1. England and Wales
(A.C. Simpson)

Cardium edule

The intensive study of the cockle stocks in the Burry Inlet (S. Wales) has continued and has shown that little now remains of the very abundant 1963 year-class which has given greatly increased landings during recent years. The dominant year-class is now the rich 1967 year-class. Oyster-catcher predation has increased with over 17,000 birds feeding on the cockles in December. An intensive programme of marking the birds with coloured leg bands is being undertaken to study the duration of stay of the birds in the estuary.

Spatfall in the Thames estuary has been poor since 1963. Hydraulic dredges are now in regular use in the fishing. Cockle resources in the Wash have been surveyed and found to be substantial.

Crassostrea angulata

Work on the gill disease has continued and it is believed that the disease reported in Portuguese oysters in France is also present in most stocks in England.

Mytilus edulis

Spatfall monitoring using rubberised hair pads has shown densities in Morecambe Bay some 10 times greater than those recorded at Bangor (N. Wales). At Bangor some spatfall was recorded in every month with peak sublittoral settlement in summer and late autumn, compared with January for the intertidal pads.

Ostrea edulis

Experiments on the handling of seed oysters from Norwegian polls have shown that good growth and survival can be obtained by keeping them in netting trays at low water mark of ordinary tides, provided the density in the trays did not exceed about 2 kg per m².

Observations in the Fal estuary (Cornwall) showed that, for the second year in succession, spatfall had been very poor in spite of good larval production.

Hatchery rearing on a semi-commercial scale was badly affected by what is believed to have been a bacterial infection of the larvae, but the setback is being overcome by improved methods of handling them.

Continued study of suitable foods for rearing oyster larvae has shown best growth and survival of spat with mixtures of algae. Among individual foods, the diatom Chaetoceros calcitrans from Japan has proved easy to culture and has given good growth.

Pecten maximus

Stocks off Plymouth have been surveyed and shown to be extensive but slow growing. Over 2,000 scallops were marked with numbered plastic discs, wired on through a hole in the shell. An additional 200 scallops carried tags attached by epoxy-resin adhesive as well as the wired tags. Experiments to compare the efficiency of a 5' Baird sledge dredge with a 5' Manx dredge and a 6' French dredge showed that the Baird dredge outfished the Manx dredge at all speeds between 2 and 4 knots, and the French dredge at speeds over 2.5 knots, but that the larger French dredge caught 10% more at lower speeds.

Venerupis spp.

Surveys for V. pullastra and V. decussata have shown neither species to occur in commercially useful quantities. However, the sublittoral species V. rhomboides is common in a number of areas. Hatchery rearing of V. decussata has been very encouraging.

2. Scotland

(H.J. Thomas)

Cardium edule

The results of the transplanting experiments carried out at Barra have been worked up.

Chlamys opercularis

A preliminary study is being made of the distribution of the exploitable stocks of queens for which a new commercial fishery has developed.

Mytilus edulis

Experiments on the rope cultivation of mussels have been continued in two areas of different potential off the west of Scotland. In the more promising area mussel growth was such as to permit harvesting for commercial use only eighteen months after settlement. Further studies have been made on the period of settlement.

The predation of rope-cultivated mussels attributable to eider ducks has been studied.

An outbreak of paralytic shellfish poisoning off the north-east coast of England and south-east coast of Scotland in the summer of 1968, which led to the death of fish and birds and resulted in poisoning to man, was monitored by toxicity tests on mussels and scallops. This work was carried out in co-operation with universities and with the English laboratories.

Further sampling of mussels for infestation by Mytilicola was undertaken.

Ostrea edulis

Field experiments have continued in the use of suspended culture techniques for growing oysters on the Scottish west coast. Results are promising but in some places fouling of the oysters by barnacles, tube-worms and ascidians is a problem.

Laboratory experiments, using bacteria-free cultures of oyster larvae and artificial sea-water, have been successful and can be used to study the factors affecting the growth and mortality of the larvae.

Pecten maximus

Catch and fishing effort data have been collected from selected boats and samplings undertaken of the commercial catch from the Clyde, the west coast and Shetland. Further research-vessel explorations for unexploited scallop beds have been undertaken. A study is being made of the early life-history of the scallop.

Benthos

Food-chain studies

Work in 1968 was directed mainly towards the part played by bottom fauna in the overall food chains of a sandy bay.

Coastal survey

Surveys of the bottom fauna on fish feeding grounds round the Scottish coast have been continued. A number of exposed beaches on the north coast were examined in 1967 and in 1968 this work was extended to the south-west coast. As before, samples were collected for macro- and meio-fauna counts, for soil analyses, and for salinity determination. The macro-fauna was found to be much richer than on the northern exposed beaches, with about ten times as many common species, and a biomass of over 5g/m² dry weight, compared with less than 1 g in the north. The sand macro-fauna reached its maximum in the more sheltered areas, and this was associated with an increase in the lamellibranch fauna - nine species compared with only one on the exposed beaches. These data are being used in particular in a study of the recruitment of fish food to the bottom, and of the factors causing fluctuations in this recruitment.

U.S.S.R.

(S.G. Fedorov)

Cephalopoda

During early 1968 in the region off the Atlantic coast of the U.S.A. observations were made on the distribution and biology of the squid, Loligo peali. 5,800 specimens were measured and samples were taken for studying, feeding, etc.

Benthos

In June Soviet scientists, together with scientists of Finland, investigated the bottom fauna of the territorial waters along the south coast of Finland. 75 samples were obtained to work out the characteristics of the zoobenthos. In September 15 bottom samples were obtained from the middle and eastern parts of the Gulf of Finland to determine the coastal fauna there. The ecology of some important benthic glacial relics was studied. The influence of salinity, temperature and manganese concentrations on the bivalves and crustacea in the Gulf of Riga were investigated.

Canada (continued)

(D.G. Wilder)

Benthos

The benthic fauna and flora of a typical oyster producing area were investigated. The following common species are listed by decreasing area of distribution - Yoldia limatula, Zostera marina, Macoma balthica, Mytilus edulis, Crassostrea virginica, Mya arenaria and Volsella demissa. Y. limatula predominated where sediments comprised over 70% silt-clay and the salinity was high and stable. It was replaced by M. balthica on similar bottoms where the salinity was reduced at least seasonally. M. edulis predominated in a zone of coarser sediment. M. arenaria occupied the sandy lower intertidal zone. Most of the species appeared to be distributed independently of other species with a large, apparently random component to the pattern of occurrence.

Initial trapping and binding of sediment to the substrate is caused mainly by colonial diatoms. Silt trapping on a larger scale is accomplished by hydroids, M. edulis and Z. marina.

The fish Pseudopleuronectes americanus, Microgadus tomcod and Fundulus heteroclitus are major predators on the benthos. Asterias vulgaris and Lunatia heros are important predators of molluscs.

The growth of several species of common molluscs may be faster than suggested by the so-called "annual rings".

The periodic decay of the algal mat in a saltwater lagoon results in anaerobic conditions and mass mortality of much benthos over large areas. Oysters grow well in suspended culture in this area.

CRUSTACEA

Belgium

(E. Leloup)

Crangon crangon

Evolution de la pêche et étude sélective de la crevette.

Canada

(D.G. Wilder)

Cancer spp.

Gaffkya homari grows well in the hemolymph of C. irroratus and C. borealis but is only mildly pathogenic to C. irroratus. The organism is retained for long periods by C. irroratus in which it retains its virulence for lobsters. The potential of this crab as a reservoir of infection for lobsters may be great. The ecological relationships of C. irroratus and lobsters are being investigated.

Chionoecetes opilio

A new fishery for spider (queen) crabs is developing in the Gulf of St. Lawrence. Landings rose from about 450 metric tons in 1967 to over 4,500 metric tons in 1968 with further increases expected in 1969.

Homarus americanus

Immature lobsters held under long-day photo period for 10 months have moulted up to three times, whereas, those held under short-day photo period have failed to moult.

Where water temperature and size of lobsters are known, the time of moulting can be predicted up to 2 months in advance from changes occurring within the pleopod.

A study of the anatomy, histology, histochemistry and fine structure of the moulting gland (Y-organ) has been completed.

The standing stock of lobsters on an artificial reef made in 1965 is now about two thirds that on nearby good natural grounds. Of 200 clay or concrete tiles placed as cover in 5 to 10 metres of water, 16% of some groups were occupied within 3 months.

Effluent from a new large bleached kraft mill does not appear to have deleterious effects on the abundance and distribution of larvae.

Mortalities during storage were assessed by storing 2,400 kg of lobsters for 3 months in a new 15 x 30 x 5 m experimental tidal pound of reinforced concrete.

To reduce excessive fishing effort, limits of 250 to 400 traps per boat have been introduced and restrictions placed on entry into the fishery.

Observations by divers suggest that lobsters react to increasing light intensity and storm conditions by moving to deeper water. There was a general movement to deeper water in fall and to shallower water in spring. The occupancy of marked shelters suggested territoriality and homing. Well fed lobsters in cages or capsules grew faster than lobsters in nature.

The lobster's gastric juice is bactericidal for Gaffkya homari and prevents infection through ingestion of infected food. A rupture in the lobster's membranes is essential for transmission of gaffkemia. At 3°C over 80% of infected lobsters died within 250 days. At 1°C G. homari is retained by lobsters for long periods at sublethal, undetectable levels that can rise to lethal levels if temperature rises. Gaffkemia causes a drastic decline in hemocytes, hepatopancreatic glycogen and hemolymph non-protein nitrogen. Gaffkemia causes rapid mortality among lobsters acclimated to low salinity but salinity shock may temporarily arrest the disease.

For lobsters starved at 5, 10 and 15°C, the decline in muscle and hemolymph was inversely related to temperature. Fed lobsters maintained or increased muscle weight at all temperatures.

Exposure to as little as 10 parts per billion of the insecticide Lindane for 30 minutes can paralyse lobsters but does not kill them readily. Recovery within 48 hours is possible.

Small amounts of ecdysone-like material have been isolated from lobster blood, from two genera of seaweeds and in higher concentrations from yew branches. A chemical assay method of ecdysones has been developed.

More than 5,000 adult lobsters introduced into a small ocean basin on the west coast of Vancouver Island, British Columbia, have shown that individual lobsters survive indefinitely in the Pacific. Growth, maturation, mating, egg-laying, fecundity, embryonic development and hatching all appear to be normal. In a hatchery built at the transplant site, survivals of 65-70% from Stages I to IV have been obtained with improved diets and temperature control. Juveniles hatched in the Pacific and maintained in surface cages are now entering their 4th year. Of 10,000 Stage VI to VII juveniles released, some have successfully colonised the substrate. Larvae change abruptly and permanently to benthic mode midway through Stage IV, displaying a significant preference for sand and rock rather than plain sand.

In studies of olfaction, 70-80% of the lobsters responded to saltwater extracts of fresh cod, lobster or shrimp; 40-50% responded to tryptophane, leucine, glucosamine, and fumaric acid. The response to 13 other organic compounds was much less. Male lobsters (58%) responded to water from a tank containing newly moulted, mature females.

Pandalus borealis

A fishery for pink shrimp is developing in Canadian Atlantic waters. About 1,000 metric tons were landed in 1968. The major fishery is at the mouth of the Bay of Fundy, contiguous with the much larger United States fishery in the Gulf of Maine.

Denmark

Greenland

(E. Smidt)

Pandalus borealis

Offshore trawling experiments for deep-sea prawns were made in the Davis Strait in the deeps between the fishing banks and between the banks and the coast. In several localities the results were very good, and further experiments are planned for 1969.

Finland

(S.G. Segerstråle)

Crangon crangon

A study of the biology of Crangon crangon has been made.

France

(L. Marteil)

Jasus lalandei

Les conditions d'acclimatation de Jasus lalandei sur les côtes françaises ont été précisées.

Homarus vulgaris

Sur les cantonnements créés depuis quelques années, on a étudié les déplacements de Homarus vulgaris; on a pu constater que l'établissement de ces réserves avait eu un effet sur l'augmentation de la taille des individus.

L'élevage des larves de homards et de la langouste du Cap a été expérimenté en aquarium.

Germany
(K. Tiews)

Crangon crangon

The investigations of the 'Institut für Küsten- und Binnenfischerei' to assess the share of undersized protected fish in the catch of the German shrimp fishery and the fluctuations in the abundance of fish species found on the shrimp fishing grounds were continued. A total of 333 samples (= 1,622 kg) of unsorted catch of the shrimp fishery were collected in Büsum, Cuxhaven and Dornumersiel, and analysed as to their species and length composition.

The tagging experiments conducted during the period of 1962 to 1967, during which about 60,000 shrimps were tagged, were discontinued, but the results obtained compiled. The experiments shall not be continued in the near future.

The investigations on the distribution of shrimp larvae along the German coast were continued. Samples were taken also during the winter months on a large scale.

Investigations on the infection of Crangon crangon with the so-called spot disease were initiated at the 'Institut für Küsten- und Binnenfischerei'.

Homarus vulgaris

Rearing and crossing experiments with lobsters of different origin were continued by the Biological Station at Heligoland as well as stock assessment work on the lobster population of Heligoland.

Pandalus spp.

Numerous samples of deep-sea prawn catches made by German fishing cutters in the Farne Deep area and on the Fladen Ground were taken and analysed as to their species and length composition at the 'Institut für Küsten- und Binnenfischerei'.

Iceland
(U. Skúladóttir)

Nephrops norvegicus

Catch per unit effort data have been maintained from all fishing areas, showing a considerable decrease in catch/effort as a rule.

Routine sampling of Nephrops has been continued, particular attention being paid to the annual cycle of ovary and external egg development.

Comparative fecundity studies of ovaries and external eggs have been initiated, showing a somewhat lesser number of eggs than in the more southern regions of Europe.

A Nephrops survey off the south and south-west coasts of Iceland revealed no new fishing grounds.

Pandalus borealis

In 1967 the prawn trawl was enlarged from 60 feet to 90-100 feet in Ísafjarðardjúp. The larger trawl has now become very popular in Arnarfjörður also.

In the exploratory fishing carried out in August in the east of the country, prawn grounds were discovered in Seyðisfjörður where 392 kg/hour were obtained. The bottom temperature was 0.47°C on the prawn grounds. This is unusually cold for Seyðisfjörður. Since the autumn and up to this time, fishing has not proved successful in Seyðisfjörður, the catch having been, at the most, 26 kg/hour.

In December mesh experiments were carried out comparing 40 mm meshes with the usual 32 mm.

Two tagging experiments were carried out on prawns in an aquarium using the method of Tiews. In these experiments moulting was never successful. Routine sampling has been done to study sex, size- and age distribution. Collecting of catch and effort data and samples (for counts per unit volume) have been continued.

Ireland
(F.A. Gibson)

Homarus vulgaris

A census was completed of the total number of traps in the 1968 lobster fishery. This information provided details of the number of each type of trap in use and the number and category of boats involved. These data were related to the catch of lobsters up to the end of 1968.

A number of fishermen volunteered to keep diaries, involving catch per unit effort, and this was the first year in which this has been attempted. Not unexpectedly, since it was the first year, the response was small. However, fishermen from all coasts were represented in the scheme and the information provided by them is of great value.

The lobster catch from all coasts was examined at central collecting stations. The information gleaned from this study fits in well with the trap and boat census as well as with the catch per unit effort data.

Through the services of a student a good start has been made to the study of ovarian development in Homarus vulgaris. The initial work has led to satisfactory histological techniques, which should now unravel the question of frequency of egg bearing in this species.

Nephrops norvegicus

The stocks in the Irish Sea were examined critically, particular attention being paid to size distribution at different depths. A further cruise was used to determine factors involved with diurnal variation of the catch, this time relating catch to depth and water conditions as well as time of day.

Regular research and market samples were examined in the usual way.

Palinurus vulgaris

Specimens tagged with a plastic arrow tag embedded in the suture tissues, were held in captivity. After a period of some months, heavy mortality amongst these specimens began to occur. It was noted that some tags fell out, whilst in others the wound which they caused initially, did not heal and in many cases became severely infected. It was concluded that this type of tag is too severe on this species.

With the aid of under-graduate bursars, a large number of crawfish were examined, mainly for sex, carapace length, stage of external egg development and hardness of the exoskeleton.

Netherlands
(P. Korringa)

Brown shrimps

In 1968 the new rotating sieve for sorting out the shrimp catch on board came into commercial use. The results obtained with this machine were highly satisfactory. This new machine is a very important tool for safeguarding undersized shrimps and flatfish caught in the nets of the shrimpers. For the individual fishermen it has several other advantages, less heavy work on board, a better selection of the catch and an improved quality of the consumption shrimps.

During this year regular shrimp larvae surveys along the Netherlands coast and bi-monthly surveys of Oosterschelde and Grevelingen were started.

The method of forecasting the October landings of consumption shrimp on the basis of the February temperature of the sea-water has been improved. The fishing area of the Netherlands shrimp fleet is subdivided into three sections, north, north-west and south, each with their own correlation between landings and water temperature. In the south this correlation does not exist probably due to the influence of polluted river water in the estuaries of the Rhine, Meuse and Scheldt.

Laboratory experiments to test the influence of Rhine water on shrimps were started in November.

Norway

(K.R. Gundersen)

Cancer pagurus

Tagging experiments on crabs were continued during 1967. The Norwegian tagging method was used. In Hjeltefjord area and in Møre and Romsdal (north of Bergen) respectively 815 and 998 tagged crabs were released.

Homarus vulgaris

Tagging experiments on lobster in the field and in aquaria were continued. The majority of the lobsters tagged in the field experiment consisted of animals close to the legal size (22 cm).

Poland

(L. Zmudziński)

Miscellaneous

Observations were made on the taxonomy, morphometry and ecology of commercial species of crustacea obtained during a summer and autumn cruise on the north-west coast of Africa.

Portugal

(H. Vilela)

Penaeidae

Studies, chiefly related to reproduction, were made on the Penaeidae from the south coast of Portugal and the north-west coast of Africa.

Sweden

(B.I. Dybern)

Cancer pagurus

The crab investigations have been greatly intensified during 1968. The behaviour, population density, mobility, etc. have been studied by diving and underwater television and in aquarium experiments. About 1,000 individuals were tagged and released at different places.

Homarus vulgaris

The recording of the catches by various kinds of fisherman and the tagging and diving investigations have been continued.

Nephrops norvegicus

Daily information on the fishing results was obtained from a large number of trawlers along the Swedish west coast. It was thus possible to compare the efficiency of the fishery for Nephrops with the by-catches on the different fishing grounds used by Swedish fishermen.

Pandalus borealis

Continued information on the commercial prawn fishery has been obtained from 20 deep-sea prawn trawlers. The catches were increasing during the spring but declined again during the autumn, mainly due to mass-occurrences of the medusa, Tina bairdii, similar to those occurring in 1966-1967. Preliminary hydrographic data suggest a connection between the Tina occurrences and water temperatures which were somewhat lower than usual.

United Kingdom

1. England and Wales

(A.C. Simpson)

Cancer pagurus

An intensive study of the biology of the crab stocks on the south coast of England has been started and has included the release of 1,500 crabs tagged with the suture tag.

Suture tagged crabs, from 2,200 tagged off Yorkshire in 1965 and 1,000 off Norfolk in 1966, continued to be returned. During 1968 one male and one female crab were recaptured which had moved over 35 miles from south to north Yorkshire, while two female crabs had moved 50 miles north from Norfolk being recaptured in the south Yorkshire fishery.

Crangon crangon

Studies of the biology of this species and the fishery for it are being intensified, with special emphasis on the east coast fisheries of the Wash and Thames estuary. Analyses of catch and catch-per-unit effort data from the Wash for the past 6 years have shown striking changes in the seasonal abundance from year to year.

Homarus vulgaris

Population studies have been centred on the north-east coast of England where a further tagging experiment was done off Yorkshire.

Nephrops norvegicus

Further observations on the survival of undersized Nephrops returned to the sea during commercial fishing operations in the Irish Sea showed that 25-40% of the small Nephrops were already dead on being brought aboard after a three-hour haul but in cool weather further mortality was small and on being returned to the sea after sorting aboard over 50% were usually strongly alive.

Palaemon serratus

Batches of larvae reared in the Conway hatchery early in the year failed to survive when there was a bloom of Phaeocystis in the Conway estuary. Subsequent batches grew well and were used to study growth and survival at varying densities between about 120 and 2,000 per sq.m. of floor space. Extensive experiments using prepared and natural foods showed best growth with natural mussel flesh, though concentrations bound with gelatin were promising. The possibilities of rearing non-indigenous faster growing prawns are being studied.

Palinurus vulgaris

The study of the stocks of crawfish off Cornwall have been continued. Samples of crawfish between October and May showed 70-98% of the females were carrying eggs, indicating that most females carry eggs every year and that stocks off Cornwall are largely of mature animals. 860 crawfish have been tagged over the last 3 years using the barbed plastic strip inserted between two abdominal segments. A total of 39 have so far been recaptured. As tagging mortality is not believed to be high, this suggests a low fishing mortality. Recaptures have shown only limited movements of a few miles.

2. Scotland

(H.J. Thomas)

Cancer pagurus

Sampling of catch of edible crabs and collection of catch and fishing effort data from selected boats have been maintained from the main fisheries. Further returns of tagged crabs have been made from releases in 1967.

Crangon sp., Pandalus sp.

Collection of catch and effort data for the brown shrimp fishery off the south-west of Scotland has been maintained. Research-vessel cruises have investigated the distribution, abundance and catch composition of pink shrimps.

Homarus vulgaris

Catch, effort and catch-composition data have been maintained for all the main lobster fisheries. Monthly sampling of the commercial catches was undertaken at Orkney and elsewhere, annually. 1,000 tagged and marked lobsters were released on the lobster fishing grounds off the south-east of Scotland. Comparative fishing experiments were undertaken using parlour and Scottish type traps.

Nephrops norvegicus

Monthly sampling on board commercial trawlers has been continued in the Firth of Forth and catch-composition data maintained. Research-vessel fishing for Norway lobsters has been undertaken in other areas both by trawl and creel. Experiments were carried out in the aquarium on the feeding of Norway lobsters.

U.S.S.R.

(S.G. Fedorov)

Penaeus duorarum

Observations were made on the oogenesis of the shrimp, Penaeus duorarum, off the coast of West Africa. Some 300 gonads were fixed in Bouin's fluid and 200 in formaldehyde. A scale for determining the rate of maturation of the ovaries was worked out.