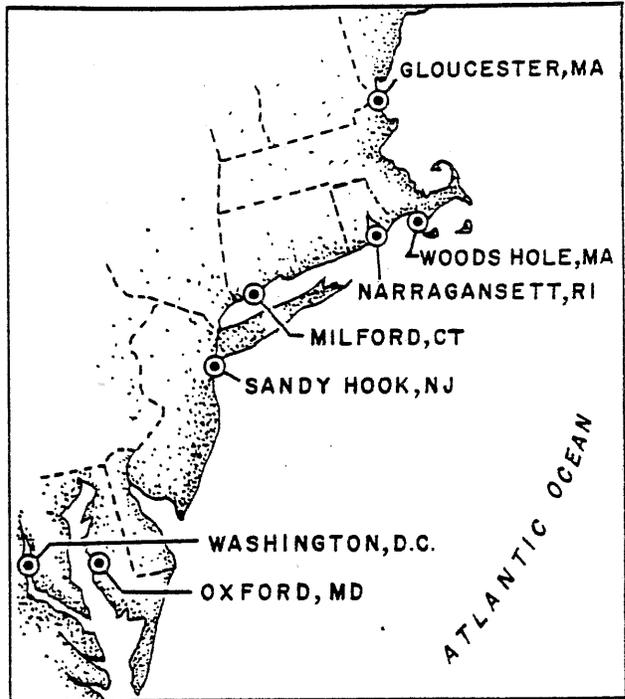


# NEFC

Northeast Fisheries Center

# NEWS

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Editor, Jon A. Gibson



U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL MARINE FISHERIES SERVICE



## RESOURCE ASSESSMENT DIVISION

### Resource Surveys Investigation

The first leg of the autumn bottom trawl survey (from Cape Hatteras to New Jersey) aboard the Delaware II (Charles Byrne, Chief Scientist) was completed on 7 October. The second leg (from New Jersey to Georges Bank with Linda Despres as Chief Scientist) was completed during 11-21 October. The third leg (from Georges Bank to Nova Scotia) began on 25 October (William Overholtz, Chief Scientist) and will terminate on 7 November. The fourth and final leg will complete the work in the Gulf of Maine on or about 22 November.

Tom Azarovitz and James Crossen participated in a survey for Atlantic herring aboard the FRG R/V Anton Dohrn during 10-30 October. Operations included echo sounding and bottom trawling throughout Georges Bank, northward to Jeffreys Ledge, eastward to Browns Bank, and southwesterly to Nantucket Shoals. In spite of a comprehensive search of the above area, catches from about 75 trawl tows yielded less than 100 herring.

### Age and Growth Investigation

A second series of age samples, consisting of red hake and silver hake otoliths, has been received from the USSR age readers for monitoring their age data. The material is being processed.

Fred Nichy edited a paper on aging of Atlantic bluefin tuna. He also wrote a portion of a document describing ways of enhancing growth zones on tuna otoliths with metal stains and with heat which will be presented at the 1977 ICAAT meetings.

Judy Penttila and Vi Gifford rechecked all Atlantic cod age data from fall cruises of the Albatross IV for the period 1970-1974, and also the audits from the data. Hilary Herring, a cooperative student, has been examining various hard parts of goosefish to find a suitable structure for aging this species. Examination of otoliths indicates they have only limited use for aging this species. Loretta O'Brien, from the Graduate Science Program, has been learning how to age sea scallops.

Age samples completed during October include: yellowtail flounder (commercial samples for October through December 1976); redfish (Albatross IV Cruise No. 77-01 samples) (audit check completed); and red hake (Albatross IV Cruise No.'s 73-03, 73-08, and 72-02 samples).

### Fisheries Statistics Investigation

Investigational personnel who participated in fall survey cruises were: Thurston Burns, Harold Foster, Maureen Griffen, and David Dodson on the southern leg and Ralph Mayo and Pam Lanham on the Georges Bank leg of the groundfish survey; and Frank Almeida on the international herring tagging cruise aboard the USSR Yubileiniy. Atlantic herring were hard to find and only 943 tagged fish were released. Recoveries to date number about 500 (with the total number tagged at 63,000) taken mostly along the Maine and New Brunswick Coasts.

The primary activities in fisheries assessments included: Anne Lange looking at US and Canadian squid assessments and the possibility of a joint meeting in early 1978; preparing squid survey summaries and the current survey plan for the USSR Argus; looking into the possibility of aging squid using length-frequency analyses; studying the relationships between squid distribution and temperature; and developing a squid management plan with the regional fishery management councils. Steve Murawski, Gordon Waring, and Maureen Griffen prepared summaries for a butterfish assessment. Brian Hayden and Gordon Waring detailed Atlantic herring summaries in preparation for Vaughn Anthony's reassignment to the State of Maine. Frank Almeida worked closely with the S & S Committee of the New England Fishery Management Council in looking toward the development of a silver hake management plan. Paul Wood and Harold Foster began review work as part of an Atlantic cod assessment team working to update the cod assessment.

This latter work has taken on particular importance with the current cod fishery reaching quota-closure levels in early fall. Subsequent analyses of by-catch and industry economic implications allows for the easing of by-catch restrictions until the end of the year with the caveat that any overages must be included in the 1978 analyses and quota level establishment. In this regard, Ralph Mayo and Bill Callahan worked closely with the Regional Office staff to prepare the appropriate summaries of cod catch and value and patterns of by-catch by vessel classes to provide guidance for the 1977 by-catch adjustments. In other related work, Gene Heyerdahl and Ralph Mayo assisted in briefing both regional fishery management councils and their staffs on the tasks and data involved in making assessments.

#### Sandy Hook Investigation

Analysis of the data collected during a 2-mo survey of recreational Atlantic cod catches at Montauk, New York, was completed. In spite of the fact that only 2 out of 10 party boats and 0 out of 41 charter boats fished for cod, cod were the third most abundant species by both weight and numbers in the overall landings. Bluefish ranked first by weight and second by numbers in the overall landings and scup were first by numbers and second by weight. Species of major importance to party boats were scup, cod, summer flounder, red hake, and black sea bass, ranked by number caught in descending order. Species of major importance to one-half-day charter boats were bluefish, weakfish, Atlantic bonito, and striped bass. Species of importance to full-day charter boats were bluefish, Atlantic bonito, weakfish, and pelagic sharks.

Processing of data from the 2-yr New Jersey survey continued. Length and weight data from the first 15 mo of the survey were audited, corrected, and listed. Fecundity estimates for Atlantic mackerel were also completed. Members of the Sandy Hook Investigation also participated on four cruises in October.

#### Fisheries Analysis Investigation

Brad Brown, Vaughn Anthony, Emory Anderson, and Fred Serchuk presented assessment reviews at the joint New England/Mid-Atlantic Fishery Management Council meeting held in Woods Hole on 19 October. The staff presentations focused upon the data sources and assessment procedures that are currently used

in the fisheries assessments. Brad Brown and Fred Serchuk attended a meeting of the New England Fishery Management Council Groundfish Committee on 27 October in New Bedford, Massachusetts. Fred Serchuk attended a second meeting of the Groundfish Committee on 28 October in Portsmouth, New Hampshire. Mike Sissenwine reviewed the Draft Fishery Management Plan for squid prepared by the Mid-Atlantic Council, and also reviewed Japan and USSR proposals for 1978 foreign fishing regulations for squid, butterfish, and dogfishes.

Investigational personnel participated in a 2-day technical workshop designed to acquaint the staff of the NEFMC and MAFMC with the Center's data facilities, data base, and analysis techniques on 6-7 October in Woods Hole. Most investigational personnel also participated in a joint US-Canada assessment meeting held in Woods Hole on 12-13 October. Fred Serchuk attended the annual meeting of the Atlantic Fisheries Biologists held 7-9 October in Charlottetown, Prince Edward Island, and presented a review of the US fisheries assessments under extended jurisdiction. Steve Clark presented a paper prepared by Steve and Brad Brown entitled, "Trends in Biomass of Finfishes and Squids in ICNAF Subarea 5 and Statistical Area 6, 1964-1967, as Determined from Research Vessel Survey Data," at the Workshop on Population Dynamics in Fisheries meeting at Instituto de Investigaciones Pesqueras, Barcelona, Spain.

#### Meetings, Talks, Visitors, Publicity

Emory Anderson and Henry Jensen gave presentations on the Atlantic mackerel assessment and the conduct of the bottom trawl surveys, respectively, at an assessment workshop held in Woods Hole on 6-7 October for staff personnel of the New England and Mid-Atlantic Fishery Management Councils.

Emory Anderson participated in discussions with Canadian scientists in Woods Hole on 12-13 October regarding the mackerel assessment. He also gave a talk on 19 October in Woods Hole to a combined session of the New England and Mid-Atlantic Fishery Management Councils, including their respective S & S Committees and staffs, on assessment methodology, using the mackerel assessment as an example. On 20-21 October, Emory Anderson was in Ottawa to discuss mackerel, silver hake, red hake, and squid with USSR scientists and also attended briefly the ICNAF-NAFCO meeting.

Gene Heyerdahl attended the meetings of National Data Management Committee in Washington, DC, on 4-5 October as well as the US/Canadian technical advisory committee meetings in late October working on a new bilateral agreement between the two countries. These negotiations have reached agreement on the establishment of a joint commission and current work is attempting to delineate the terms of joint management of the stocks.

Gordon Waring spent the first week of October touring the Atlantic herring processing plants along the coast of Maine and his trip report is available to those interested in this aspect of the fishery.

#### MARINE ECOSYSTEMS DIVISION

##### Benthic Dynamics Investigation

A report entitled, "Marine Macrobenthic Invertebrate Fauna of New England. Part I. Collection Data and Environmental Measurements." by R. L. Wigley, R. B. Theroux, and H. E. Murray, was completed this month. This report lists the station data and environmental information associated with quantitative

macrobenthic collections for the geographical area extending from southern New England northward to Canada. Data files in ADP format for multispecies invertebrate density and biomass, and for distributional data related to bivalve mollusks, were assembled and checked in preparation for analysis.

A report ("Food Habits and Food Resource Partitioning by Northwest Atlantic Demersal Fishes. Part I. The Gadiformes," by R. W. Langton and R. E. Bowman) on the food habits of the Gadiformes was finished. It describes the foods of 15 gadiform species by ecological area, sex, season, year, and concludes with a discussion of diet overlap and resource partitioning between species. Data on the food habits of juvenile haddock during 1953-1976 have been entered on computer tapes and are currently being analyzed. The Polish Wieczno Cruise No. 77-05, conducted to study predator-prey relationships of Atlantic herring, was completed in early October. Although no large concentrations of pre-spawning herring were located, a total of 1,092 stomachs was collected from various species of fish, some of which were observed to have preyed upon herring or herring eggs. Richard Brodeur and Laretta Sullivan from the NEFC participated in this cruise.

Ray Bowman and Wendy Wolfe, a CETA volunteer, participated on the southern leg of the fall bottom trawl survey cruise (Delaware II Cruise No. 77-12) which returned to Woods Hole on October 11.

Richard Langton participated in the herring-Ocean Pulse study in collaboration with the NEFC Manned Undersea Research and Technology Program. Stomachs were collected from potential predators (haddock, Atlantic cod, pollock, etc.) of herring eggs. Unfortunately, to date, the herring have not spawned in the Jeffreys Ledge area of the Gulf of Maine and therefore subsequent stomach collections have been postponed.

#### Ecosystems Dynamics Investigation

Work continued on Georges Bank productivity studies. Ed Cohen went to Boothbay Harbor to review the final contract report on Georges Bank productivity studies with the staff at Bigelow Laboratory and discuss plans for further analysis and publication of these data. He completed an outline of a proposed paper on the seasonal cycle of primary production on Georges Bank, which will be a joint effort with Red Wright and Bigelow scientists. Also, he prepared a first approximation energy budget for Georges Bank based on inputs made available at the last workshop which indicated a large surplus of energy in the primary and secondary production phases on Georges Bank as compared with similar calculations for the North Sea.

Mike Pennington completed an analysis of larval Atlantic herring growth data, fitting a Gompertz-Laird equation to a set of otolith age-length data based on 311 herring larvae ranging in age from 12 to 165 days. The empirical data fit the model very closely. Both Mike Pennington and Ed Cohen attended a short course on linear and nonlinear model fitting.

Marv Grosslein assisted with coordination of joint international surveys on Wieczno, Argus, and Anton Dohrn, and presented a review of the Center's MARMAP survey program for the joint sessions of the New England and Mid-Atlantic Councils in Woods Hole.

## Recruitment Processes

The first larval Atlantic herring survey of the 1977 season was conducted by the Wieczno during 4-24 October. NEFC participants included Andrew Rosenberg, Roz Cohen, Robert Halpin, Pat Carter, and Joe Kane. Standard plankton hauls (148) and hydrographic casts (60) were made during the 20-day cruise covering Jeffreys Ledge, Georges Bank, and Nantucket Shoals. A high concentration of recently hatched larvae (500-1,000 per haul) was found only at one location in the Nantucket Shoals area ( $41^{\circ}30'N$ ,  $69^{\circ}30'W$ ). Beginning on 19 October, and for the next 3 days, a series of plankton hauls (65) was made in this area to define the size, density, and movement of the patch of larvae. The larval patch was estimated to be on the order of 15 nautical miles (nm) in length by 10 nm in width, corresponding to the dimensions of rotary tidal ellipses observed in this region. The dimensions of the larval patch appeared to remain the same during the 3-day sampling period.

Greg Lough and George Bolz continued to make significant progress on the analysis of the ICNAF larval herring time series. We now have complete data for the first time on larval herring abundance and average mortality rates for the 1971-1977 seasons based on the 61-cm bongo, 0.505-mm mesh samples. The computational methods are similar to those most recently described in detail by Houde (1977, Fish. Bull. 75: 61-89). A daily growth increment of 0.195 mm was used as the best overall estimate from field data and larval otolith aging techniques to determine exponential growth and subsequent duration of an individual size class and duration-corrected abundance. Regressions of larval mean age versus duration-corrected abundance were then made to estimate the instantaneous mortality rates (Z). The results show initial larval abundance (<10-mm SL) was high for the 1973 and 1974 seasons, an order of magnitude lower for the 1971, 1972, and 1975 seasons, and extremely low for 1976. Mortality rates were 3-5%/day for the 1971-1975 seasons comparing the September-December periods, but somewhat lower for the 1974 and 1975 seasons when average mortality rates were computed through February. Notably, the 1975 season appeared to have lower mortality between the December and February surveys compared to the 1973 and 1974 seasons. Too few larvae were collected to produce a good mortality curve for 1976.

## Ichthyoplankton Investigation

The intensive series of plankton surveys in the Middle Atlantic Bight during the spring of 1977, i.e., six cruises from 19 March to 30 June, is producing some interesting results on distribution and abundance of Atlantic mackerel eggs. Although adults occurred in trawl collections taken throughout the bight in March, spawning by this migratory species did not begin until April. Eggs first occurred in our plankton samples on 11 April at a station off North Carolina's outer banks. The center of egg distribution in mid-April was in the New York Bight at stations within 10 km of shore. We resampled from Virginia to Block Island 8 days later and found a 10-fold increase in the catch of mackerel eggs. Their distribution was again centered in the New York Bight, but extended seaward to a distance of 60 km from shore. We are presently working on May collections.

## Oceanography Investigation

Much of October was devoted to completing the preliminary data reduction for our current-meter/hydrography cruise, Albatross IV 77-09, and preparing for MARMAP and larval herring cruises on three foreign ships. Steve Ramp completed the STD computer programming package with the assistance of Ms. Maxine Jones at WHOI. This has involved adding plot programs to the existing set of read, edit, and calculate programs. It is now possible to plot any of the measured or calculated variables against depth or any other variable (T/S, O<sub>2</sub>,  $\sigma_t$ , etc.); what remains is to provide data printout in a format suitable for NODC.

Plots have been completed of temperature and oxygen sections for Northeast Channel, Georges Basin, and Great South Channel based on the aforementioned cruise. A running XBT plot was kept during the cruise. The thermosalinograph record has been read and plotted. Agreement between bucket and XBT temperatures is good; the salinities remain to be compared. The instrument has been recalibrated and refurbished with new plumbing for an Anton Dohrn cruise where it will provide continuous surface salinity to accompany surface fluorometry.

Current-meter tapes from Albatross IV Cruise No. 77-09 have not been received from Nova University but preliminary reports indicate a full set of good records. In the meantime, Steve Ramp and John Vermersch (of WHOI) have been working with records from the six instruments recovered last spring; it appears that we have four complete records with temperature, direction, and speed, and two with temperature and direction only. There appears to be high coherence in the temperature fluctuations in all six records; how they relate to the flow in and out of the channel has not been examined.

Preparations for the Anton Dohrn cruise included assembly of five parachute drogues with lights and radar reflectors for use with MOCNESS in the vertical sampling portion of the cruise. Ron Kirschner and Tom Laughton are aboard for the drogue work and to help with hydrography. For the MARMAP cruise on Argus an oxygen analysis apparatus and chemicals were provided along with Niskin bottles, XBTs, and salinity sample bottles. Dan Patanjo, a new volunteer with our investigation, went along for the second leg of the cruise but was put ashore 6 days later with a stomach ailment. For the Wieczno larval herring cruise XBTs were provided. Tim Cain has been running the salinities for all these cruises and Sam Nickerson has been plotting horizontal temperature and salinity charts for all these cruises as well as for the fall groundfish survey.

Gil Dering has done necessary maintenance on the releases, lights, and radios recovered on Albatross IV Cruise No. 77-09, and maintenance and modification of the tape recorder for the STD, and has repaired the salinometer and looked at the Plessey instrument which will have to be sent out for repairs on the cell. He has also been preparing an operator's manual for our STD equipment and for the AMF release gear.

Plans for a through-hull installation of the AMF transducer have been worked out with AMC in Norfolk and it is hoped the necessary work can be done during the Albatross IV haul-out period this winter.

## Plankton Ecology Investigation

### Plankton Sorting and Identification

Processing of the zooplankton from the 1971-1975 spring and fall MARMAP surveys on Georges Bank is continuing with the completion of the spring 1972 samples. This data set when complete will represent a 5-yr time series.

Joe Kane participated in a 3-wk larval herring cruise aboard the Wieczno. Although plagued by bad weather they were successful in locating and sampling a patch of herring larvae.

Tom Donnelly, a Roger Williams College student who worked as a volunteer this past summer, has accepted an appointment as a student trainee.

A time analysis of the new zooplankton sorting protocol as outlined during the recent plankton workshop was completed. Following the new protocol an average sample takes approximately 9 hr to complete. Adjustments are being considered which would reduce this to 6-6.5 hr per sample.

The delivery date for the Image Analysis System is set for mid or late December.

The biomass project is currently collecting and measuring Centropages typicus for a length-dry weight regression using presorted Albatross IV Cruise Nos. 74-11 and 75-12 bongo samples (0.333-mm mesh, 61-cm net) from the plankton laboratory.

### US-USSR Joint MARMAP Surveys

The first joint US-USSR MARMAP survey in FY 1978 from Cape Hatteras to Nova Scotia departed from Woods Hole on 15 October. Operations are being conducted from the Argus to monitor seasonal changes in primary production and the distribution and abundance of ichthyoplankton, and to map hydrographic features of the region.

### Biostatistics

During October the station data from Yubileiniy Cruise No. 77-02 were entered into the computer system and a master file was created for the cruise data. Additional copies of the zooplankton data summaries for Albatross IV Cruise No. 75-02 were prepared for Ray Maurer for further evaluation of the format of the data output. The zooplankton data from USSR Belogorsk Cruise No. 75-02 have now been keypunched and will be processed in the same manner as the data for Albatross IV Cruise No. 75-02.

Ichthyoplankton data for a dozen cruises have been received from the Polish Plankton Sorting Center. The data forms which cannot be optically scanned were coded for further processing into the computer system.

Considerable effort has gone into compiling the anticipated requirements of the Marine Ecosystems Division in the area of data processing. This compilation was necessary in order to provide input to plans for a regional data processing system.

Tom Plichta has been temporarily assigned to Biostatistics to assist in data entry, quality control, and production of routine data summaries. Jerry Prezioso is participating in the second part of the joint US-USSR ecosystem monitoring cruise from 25 October to 10 November aboard the Argus. Dave Bearse received training on the use of the "Report Writer" program in the MIS for producing basic tabled output from master files.

#### Larval Physiology Investigation

Larval summer flounder are under culture and experiments to determine prey-capturing efficiency and assimilation rates are in progress. Initial measurements of proteinase activity in relation to digestive processes of larvae were made. Studies of sex determination of adult summer flounder using blood serum electrophoretic profiles are continuing with promising yet inconclusive results.

Dr. Laurence gave a presentation on larval fish energetics at the World Ocean Program, Joint USSR-USA Workshop on the Physiology and Biochemistry of Marine Organisms held in Georgetown, South Carolina.

The first draft of a manuscript describing the results of the in situ environmental chamber experiment with winter flounder larvae has been completed.

#### Apex Predators Investigation

During October, 50 sharks were tagged by cooperating sportsmen. In the same period recoveries from one sandtiger, one mako, and eight blue sharks were reported. The mako was tagged during a cruise of the Oregon II in the Gulf of Mexico north of the Yucatan Peninsula and recovered by a Japanese tuna fishing vessel 55 days later and 65 mi south by southwest of the Mississippi Delta.

An entire specimen of a longfin mako shark, Isurus paucus, captured by a commercial longliner, was examined in detail at the laboratory. It was the first opportunity for task biologists to examine a mako of this type. This species, believed for many years to be a tropical form, was caught east of Oregon Inlet, North Carolina, on 12 October. The fishermen reported having seen specimens of this shark as far north as the offings of Sable Island.

#### Meetings, Talks, Visitors, Publicity

Chuck Stillwell gave a seminar on sharks at the SEA (Sea Education Association) headquarters in Woods Hole, Massachusetts. The lecture was attended by 23 students enrolled in the fall training program.

Ken Sherman presented an overview of NEFC fisheries research to the URI Marine Management Seminar. He also presented a brief on research in the division to the New England and Mid-Atlantic Fishery Management Councils. Geoffrey Laurence, Reed Armstrong, Ken Sherman, and Lorrie Sullivan attended the IYABA meeting at the Oxford Laboratory on 13 October.

The United Way Combined Federal Campaign made a presentation to the Narragansett Laboratory staff on 11 October.

Bill Muellenhoff and Don Beaumariage of MUST (NOAA) visited with Wes Pratt to discuss advanced diving procedures.

Ken Sherman, Jack Colton, and Wally Smith participated in a MARMAP survey planning meeting at the Woods Hole Laboratory on 14 October.

Carolyn Rogers attended a symposium entitled, "Oil/Environment-1977-- Recovery Potential of Oiled Northern Environments," in Halifax, Nova Scotia, during 10-14 October. The symposium was divided into three topic areas: (1) long-term fate of petroleum hydrocarbons after spills--compositional changes and microbial degradation; (2) physiological stresses and responses in chronically oiled organisms; and (3) long-term effects of oil spills on marine intertidal communities. A trip report summarizing each session and giving an overview of the symposium was submitted to the Center.

Work continues on revising the Ocean Pulse planning document to make it more useful both to people in management and budget as well as to participating scientists.

The draft report from the Region I Oil Spill Ecological Damage Assessment Workshop which Carolyn Rogers attended is now being reviewed as the next step in the development of a regional plan for coastal and offshore spills.

Dick Kierstead, Ken Sherman, Ruth Byron, and Chuck Stillwell attended an EEO meeting at Woods Hole, Massachusetts, on 20 and 21 October.

Christine Philpott was in Gloucester, Massachusetts during 25-27 October for training in personnel management.

Bjorn Bohle, Kjell I. Johannessen, and Otto Grahl-Nielsen of the Institute of Marine Research at Bergen, Norway, toured the Narragansett Laboratory on 19 October after attending the Oil/Environment-1977 Symposium. They were particularly interested in methods for spawning and rearing fish larvae. Al Smigielski discussed the techniques used at the laboratory with them. They were also interested in our Center's approach to studying the marine ecosystems and requested literature explaining our Center's goals and research programs.

Rudolf Hermes, Michael Weber, and Gunnar Joakimsson, German scientists from the Institute für Meereskunde in Kiel, visited the Narragansett Laboratory on 28 October. They presented an informal discussion of the NEFC-FRG joint larval herring research work.

On 18 October a meeting was held in Narragansett with Kay Paine and Ed Handy from Woods Hole to deal with an evaluation of the MARMAP Information System (MIS) and to deal with specific immediate data-processing needs for ichthyoplankton data at Sandy Hook. It was resolved that a 2-day workshop should be held as soon as possible in order for Hal Peterson and the members of the MIS staff to explain the programming details of the data-processing system to Kay Paine for use in evaluating the MIS.

Antony Piotrowski of the Polish Sea Fisheries Institute in Gdynia spent most of October with our group, learning our computer programs and techniques both at NEFC and WHOI. Among others, he met with Dr. R. Payne of the WHOI Buoy Group, George Heimerdinger of NODC, Jack Jossi of MARMAP. Steve Ramp introduced him to our STD and current-meter programs and Pat Twohig demonstrated the shipboard datalogger. In addition Mr. Piotrowski worked with the computer terminal to calculate plankton densities for the Weiczno cruises last year.

Ron Schlitz attended the AGU Oceanic Fronts Conference in New Orleans, Louisiana, where he gave a poster session report on the Cape Cod Front and implications for flow through Great South Channel. The report is to be published in the proceedings of the conference.

Red Wright attended an all-day meeting on the philosophy and logistics of the MARMAP cruise program for FY 1978 and a meeting of the Advisory Board of EG&G, Inc. (environmental consultants), in connection with their work on Georges Bank for the Bureau of Land Management.

Bob Pawlowski completed the September report for the SOOP run across the Gulf of Maine (Bar Harbor to Yarmouth) and is completing the text for the historical groundfish survey temperature and salinity plots prepared by Sam Nickerson.

### Manuscripts

Pawlowski, R. J. A review of the Gulf of Maine temperature structure between Bar Harbor, Maine, and Yarmouth, Nova Scotia, from June 1975 through November 1976. NOAA/NMFS-SSRF. (S)

Price, C. A., J. M. St. Onge-Burns, J. B. Colton, Jr., and J. E. Joyce. 1977. Automatic sorting of zooplankton by isopycnic sedimentation in gradients of silica: Performance of a "Rho Spectrometer." Mar. Biol. 42: 225-231. (P)

### Reports

Wigley, R. L., R. B. Theroux, and H. E. Murray. Marine macrobenthic invertebrate fauna of New England. Part I. Collection data and environmental measurements.

Langton, R. W., and R. E. Bowman. Food habits and food resource partitioning by Northwest Atlantic demersal fishes. Part I. The Gadiformes.

### MANNED UNDERSEA RESEARCH AND TECHNOLOGY (MURT) PROGRAM

The MURT group devoted the period from 22 September through 25 October to in situ research and diver training at historical herring spawning locations and proposed Ocean Pulse stations in the Gulf of Maine. The herring spawning research yielded no evidence of spawning on Jeffreys Ledge in contrast to positive findings during the four previous seasons of similar research activity. Diver training with biological and physiographic surveys of two proposed Ocean Pulse stations, Pigeon Hill-Jeffreys Ledge and Cashes Ledge, was highly productive in terms of technology transfer, logistics, and establishment of ecological baselines at the proposed permanent stations. In addition to Woods Hole, Narragansett, and Sandy Hook diver scientists, the expedition included diver scientists from the University of New Hampshire and Southeastern Massachusetts University.

## RESOURCE UTILIZATION DIVISION

### Resource Development and Improvement Investigations

#### Squid Skinning and Eviscerating Machine

The various mechanical assemblies that will be used to eviscerate and skin squid have been assembled into the processing machine and the testing of the machine is now underway.

#### Primary Fish Sorter

The primary fish sorter was moved to a location beside the fish house where it will have an adequate supply of water to conduct tests on mixed bags of fish. The tests have already been started.

#### Whiting Processing Machine

The whiting processing machine, which has been in one of the processing plants in Gloucester for an extended period of time, has been returned and given a complete overhauling. It will be placed in another processing plant in Boston where it will be put to commercial-scale tests.

#### Sampling and Harvesting Gear Development

Al Blott is working on a squid paper in cooperation with Vincent Ampola. Vern Nulk finished his section of the lobster paper and is helping John Kenney with the design and construction of the modified squid-processing machine. With the addition of Dan Baker to our program, work has begun on testing of the primary sorter. The sorter has been moved to the fish house and the first test runs with a sample of whiting (silver hake) have been performed.

### Product Quality, Safety, and Standards Investigations

#### Product Quality

A storage study on frozen blocks or breaded sticks made with varying proportions of Atlantic cod fillets and mince is in its sixth month. Organoleptic tests, thus far, have indicated no difference between products made from 100% fillets and products made from 70% fillets and 30% mince. Progress of this study was reported by Fred King at a recent international meeting at Bergen, Norway.

Organoleptic and chemical tests were conducted after 5 mo of frozen storage on minced whiting made from either large fish or small fish and also on minced whiting that had been minced either cold (34°F) or warm (60°F). It is premature at this time to draw any significant conclusions from these two storage studies. We are continuing to monitor fat content of variously sized whiting. A standard assay is being developed to measure the activity of the formaldehyde-dimethylamine-forming enzyme extracted from whiting. Purification of the enzyme is continuing using ultrafiltration and gel filtration.

## Product Safety

Work on the isolation and analysis of volatile N-nitrosamines in hot-smoked whitefish fortified at the 1-ppb and 2-ppb level has been completed. The data and statistical analyses are being compiled and will be sent to the FDA laboratory. Some whitefish extracts spiked at the 1-ppb and 5-ppb level were taken to Dr. Moreau of Biomeasure, Inc. for GC-MS analysis. Analysis of selected whitefish extracts by GC-TEA has been completed, and the report will be available shortly. Work on the isolation and analysis of volatile N-nitrosamines in cold-smoked salmon (red and white) is continuing.

## Product Standards

Much of this period was devoted to attending Codex meetings in Washington, DC, and in Europe. Additionally, some time was spent on investigating research results on minced fish that focus on safety and public health aspects.

## Technical Assistance, Meetings, Talks, Visitors, Publicity, Training

George Biondo of Sweet Crab Company, Long Island, New York, visited the Gloucester Laboratory on 14 October. Mr. Biondo is interested in processing Jonah and rock crabs. We suggested several mechanical methods that may be applied to the processing of these species.

Ms. Rita Dumbrosky, President of the Gloucester Fishermen Wives Association, visited the Gloucester Laboratory to discuss squid marketing in the US and the exportation of the product overseas.

Technical advice was given to: Peter Douglas from Providence, Rhode Island, on lobstering and trawling; the North Atlantic Fisheries from Boothbay Harbor, Maine, on squid harvesting; the J. J. Henry Company, naval architects from Cohasset, Massachusetts on fishing vessels; and Frank Lavine from Medford, Massachusetts, on ocean quahog harvesting.

Professor Herbert Hultin of the University of Massachusetts was given a brief outline of the division's activities.

On 14 October John Ryan participated in a meeting with the USDA's Food Safety and Quality Division concerning the safety of mechanically deboned meat.

Fred King participated in the Twelfth Session of the Codex Committee on Fish and Fishery Products held in Bergen, Norway, during 3-8 October. International standards for fishery products were reviewed and discussed.

Burt Tinker attended the Interstate Seafood Seminar at Virginia Beach, Virginia, during 4-7 October.

Bob Learson presented a paper entitled, "New Processing Opportunities in Seafoods," at the Mississippi Food and Fiber Symposium in Jackson, Mississippi. On the return trip Bob visited Red Lobster Inn's home office in Orlando, Florida, to discuss the potential of squid and mussels for menu items.

Organoleptic analyses were performed for the Massachusetts Department of Environmental Quality Engineering on samples of quahogs and clams taken from areas with previous histories of oil spills. No significant flavor differences were detected between the suspect samples and control samples.

One-day courses on, "Focus on Understanding," and on, "Reverse Discrimination," were attended by many from the Gloucester Laboratory.

This year the Gloucester Laboratory Open House attracted about 370 visitors, including groups from nine schools and colleges. (Previous high attendance for an open house was around 150.) Under the organization of Dr. Perry Lane, this event is attracting more school groups from the 4th and 5th grade to college level. Many of the teachers have taken the time to let us know how much their classes have enjoyed the opportunity to visit the laboratory, see examples of the research in progress, talk to our personnel, and, of course, try some of the products made from underutilized species. Most of the classes are either science or food preparation management in nature, and both teachers and students are generally completely unaware of the scope and nature of the work going on at our laboratory. We feel that this effort is most worthwhile in acquainting the general public, and young people in particular, with the role of the Northeast Fisheries Center and the National Marine Fisheries Service in fisheries research.

#### ENVIRONMENTAL ASSESSMENT DIVISION

##### Behavior of Marine Fishes and Invertebrates Investigation

A cooperative program with Battelle-Northwest Laboratories, supported by a grant to this investigation by NOAA's Environmental Research Laboratories (Environmental Protection Agency pass-through funding), has commenced. This project is designed to investigate the effects of petroleum hydrocarbons on behavior of the dungeness crab, Cancer magister, especially those acts which are mediated by chemoreception, e.g., food detection, localization, and reproduction.

The Battelle-Northwest Laboratory at Sequim, Washington, will be responsible for petroleum delivery systems and analysis, areas in which they are acknowledged leaders. Our own efforts will concentrate on the behavioral aspects, extending and expanding the work of this investigation's efforts on assessing the behavior response capabilities of marine fishes and invertebrates to environmental change, both natural and man-induced.

A specialized experimental aquarium system is currently being designed and constructed to continue the work on the influence of thermal edges on the behavior of young bluefish, Pomatomus saltatrix. Experimental animals are currently being held in the laboratory and experiments are scheduled to begin within the next month.

##### Biological Oceanography of Stressed Environments Investigation

During October, Craig Robertson and Christine Evans participated in a MARMAP cruise aboard the USSR's Argus for collecting netplankton and nannoplankton chlorophyll samples between Cape Hatteras, North Carolina, and Woods Hole, Massachusetts. Resulting data will be used in MARMAP and Ocean Pulse analyses to relate first trophic levels to secondary production and as indications of unusually large stocks. The data will also be important in planning in both MARMAP and Ocean Pulse. In the laboratory, work continued on the data analysis, figure presentation, and proofs for our chapter on, "The Maintenance of Anoxic Conditions Off the Coast of New Jersey During the Summer of 1976," and for our STAX II report. Data analysis continued for Synoptic Investigations in Nutrient Cycling (SINC) I and II.

Cruise preparations began for the SINC III cruise to occur in November and for our second MARMAP-Ocean Pulse monitoring cruise aboard NOAA ships Mt. Mitchell and Kelez.

### Coastal Ecosystems Investigation

We continued preparation of reports to MESA on benthic data collected on: (1) five quarterly cruises to the New York Bight Apex in 1973-1974; (2) an outer continental shelf cruise conducted in April 1975; and (3) an intensive sampling of the benthos of the sewage-sludge disposal area in February 1975. We also began work on an atlas of distribution and abundance maps of the dominant benthic invertebrates found in our sampling of the New York and Middle Atlantic Bights Apex. Proposals to resample the apex in 1978, and to examine the reliability and completeness of the overall data set, are being prepared for MESA. Work also continued on a manuscript describing effects of the 1976 anoxia on the bight's benthos.

Dr. McNulty continued the drafting of his manuscript describing the community structure of benthic invertebrate populations in the bight.

Processing of benthic samples collected in the Baltimore Canyon Trough (BCT) for the Bureau of Land Management (BLM) is nearing completion. We submitted our first quarterly report to BLM; this included: (1) preliminary data on heavy metals in BCT sediments (this information was provided by Environmental Chemistry Investigation); and (2) on macrofauna findings to date. These reports will aid BLM in preparing an EIS for an upcoming tract sale. We provided sampling gear to the Environmental Chemistry Investigation for assessing concentrations of heavy metals in polychaetes from the New York Bight, and advised on locations of historically dense polychaete assemblages near the sewage-sludge and dredge-spoils dumpsites.

### Coastal Monitoring, Assessment, and Prediction Investigation (COMAP)

A draft report of the Region I Workshop on Oil Spills held in Hartford, Connecticut, in August 1977 was received by George Kelly for review. This multiagency effort is directed towards developing regional response plans for assessing ecological damage from oil spills and other environmental stresses.

Kelly attended a meeting of the Technical Committee for the Pilgrim Power Plant to report on the 1977 results of neuston sampling for lobster larvae in southern New England and to review biological research in progress at the plant site.

Fred Lux attended a meeting of the New England Fishery Development Program Task Force on 18 October to review the program, budget, and projects under contract for the new fiscal year.

Current-year task plans and semiannual task progress reports were prepared and submitted to the Center Planning Officer on schedule.

A manuscript entitled, "Fisheries Resources of the Cape Cod and Massachusetts Bay Region," by Fred Lux and George Kelly is nearing completion.

## Environmental Chemistry Investigation

Surf clam and blue mussel samples collected for NMFS, Seattle, Washington, were inadvertently placed in plastic bags and thus could not be used for organic analyses. The surf clams will be collected again on a cruise in January or February. The blue mussels were resampled during this month. Vincent Zdanowicz, Wendy Sabol, and Jim Widman participated in a cruise on the Kelez, during 21-22 October, to obtain sediment samples for organic analyses. Fifteen of the 25 stations needed were successfully sampled. Arrangements are being made to obtain the other samples.

## Physiological Effects of Pollutant Stress Investigation (PEPS)

### Physioecology

A fourth test on the effects of copper, zinc, and mercury, as nitrates and chlorides, on embryos of the American oyster, Crassostrea virginica, under optimal environmental conditions, was completed and the results are being statistically analyzed.

A second test on the effects of copper, as the chloride, on oyster embryos and larvae at nine different salinity-temperature regimes was completed. Further tests will be performed.

Two tests were performed this month to determine the combined effect of copper and zinc on juvenile bay scallops, Argopecten irradians. Seven tests have now been completed, but one or two more tests are needed before final statistical analyses of the results can be applied.

The study to determine the effects of eight heavy metals on embryos of the surf clam, Spisula solidissima, is still underway. A third test in this series was completed this month.

### Physiological Effects

A study on the effects of arsenic on bivalve mollusks continued this month. Exposures of blue mussels, Mytilus edulis, to arsenic were continued at 15 and 25 ppt salinity. Exposure tests of the soft-shelled clam, Mya arenaria, were also initiated.

Serum samples from lobsters exposed to cadmium and then subjected to a low salinity stress were analyzed for serum osmolality, sodium, calcium, and potassium. In addition, a series of blood samples from winter flounder exposed to mercury was analyzed. The latter data are to be included in a manuscript on the effects of various mercury exposures on the hematology of the winter flounder, Pseudopleuronectes americanus.

A considerable portion of this reporting period was spent on several manuscripts that are in preparation.

### Biochemical Effects

Testing was completed on the gonads from cadmium-exposed lobsters (30 days, 6 ppb) which were subsequently cleared for 7 days at either ambient (28 ppt) or low (17 ppt) salinity. These were the final tissues to be analyzed in that experimental series, and showed a more complete clearance of cadmium effects on enzyme activity than did heart, skeletal muscle, or antennal gland. Low-salinity stress was evident in both control and cadmium-exposed animals, however, and followed the pattern observed in the other tissues, i.e., elevated MDH, depressed LDH, and a higher MDH/LDH ratio in the stressed animal. The data are from the male gonads; values vary greatly in the female, with the most activity in the immature gonads, ripe gonads having a large fraction of inert protein.

Of the four unidentified (as to species) eel larvae taken from the sewage dump area at DWD 106, one had greater than double the glycolytic rates of the others, and 10 times higher LDH and MDH activities. Unfortunately, there were no specimens for comparison from the acid dump area or from either of the control sites. The leptocephalus promises to be an excellent indicator animal, even though taxonomic differentiation is extremely difficult at that life stage. The high degree of skin permeability, however, seems to be true for all eel larvae, and it is this property that makes the animals a highly desirable subject for baseline studies.

We are currently working on the sea scallop muscle samples brought back to us from the fall scallop assessment survey cruise by Woods Hole personnel (Tom Azarovitz and Bill Overholtz). The analyses will take another 6-7 wk to complete.

An abstract was submitted to and accepted by the AAAS, on winter flounder exposed for both 2 and 5 mo to 10 ppb cadmium. The paper will be presented at the February 1978 meeting.

#### Anaerobic Bacteriology/Metabolism

The activity of the past month was directed toward researching methodology on the measurement of hydrogen sulfide produced by bacteria in water and sediment. The object is to measure the hydrogen sulfide production by various field isolates. With the availability of some year-end moneys, hydrogen sulfide electrodes and a digital millivoltmeter were obtained to set up procedures for evaluation.

A draft of a manuscript on botulinum toxin inactivation by ozone was completed.

#### Meetings, Talks, Visitors, Publicity

Several Coastal Ecosystems Investigation people attended the Estuarine Research Federation meeting at Mount Pocono, Pennsylvania, on 3-5 October. Bob Reid presented a paper on effects of spoil disposal on the benthos of the New London, Connecticut dumping ground, at the New England Estuarine Research Society session of the ERF meeting.

On Thursday, 6 October, Dr. John Pearce met with various Center personnel to discuss the current state of the Bureau of Land Management (BLM) program, analyses of BLM data, and preparation of data reports. It was noted by Mr. Robert Reid, BLM Project Manager, that most of the work is on schedule and at the present time no major problems are anticipated in regard to meeting certain deadlines. Budgeting of BLM funds within the various tasks involved in the program was discussed and specific amounts allocated.

The Physiological Effects of Pollutant Stress Investigation hosted an invertebrate zoology class from the University of Massachusetts at Amherst on 11 October. The visit included a tour of the Milford Laboratory and field collecting on the Shang Wheeler and in nearby intertidal areas.

On 11-13 October, Bob Reid attended a Corps of Engineers-sponsored workshop in New York City to examine alternative sites and methods for disposal of dredge spoils from New York Harbor.

On 13 October, Mr. Richard Greig, Mr. Richard Hall, Dr. Malcolm Meaburn, Mr. Tony Pacheco, Dr. Sukwoo Chang, and Dr. John Pearce met to discuss the preparation of the final report for the joint heavy metals studies being conducted by the College Park Laboratory and Center personnel. Introductory sections have been completed and two separate analyses of the heavy metal data have been conducted. Draft manuscripts have been prepared on these items. Still to be prepared are the summary sections.

Dr. Frederick Thurberg attended the Center Prediction Group Meeting at the Oxford Laboratory on 13 October.

On Friday, 14 October, Dr. Pearce met with Center personnel at the Woods Hole Laboratory to discuss the continuing program concerned with MARMAP I measurements in the Northwest Atlantic. Dr. Pearce also briefly reviewed the status of certain benthic data analyses which are being conducted at Sandy Hook Laboratory.

Mr. Richard Greig attended the Association of Analytical Chemists meeting during 17-21 October.

On Monday, 17 October, Dr. Michael Norton, Fisheries Laboratory, Burnham-on-Crouch, England, visited Sandy Hook Laboratory to discuss mutual programs concerned with ocean dumping. He was also briefed on the Ocean Pulse initiative which is being developed by the NEFC.

On Wednesday, 19 October, Drs. Pearce and Calabrese attended the NEFC program review for the New England and Mid-Atlantic Fisheries Management Councils at MBL, Woods Hole.

Bod Reid attended a second meeting on 20 October with EPA, NOAA, and oil industry representatives concerning design of studies to monitor effects of exploratory oil drilling off New Jersey.

On 20 October, Dr. Pearce gave an evening address to the Ocean County Environmental Agency. This presentation emphasized some of the environmental problems which impact on marine fisheries off the New Jersey coast.

Mr. Herb Stern and Dr. Gene Heyerdahl visited various Division personnel at Sandy Hook Laboratory to discuss problems concerned with ADP services at Sandy Hook.

On 26 October, Drs. Pearce and Sindermann met with Dr. Richard Ellis, Director, New Jersey Marine Science Consortium, to discuss activities of mutual interest to the NEFC and the Consortium. The meeting resulted in a decision that Drs. Pearce and Sindermann should be involved in a Sea Grant review process of the proposals being submitted for funding by New Jersey Marine Science Consortium. About a dozen of these proposals relate directly to inshore aspects of the Ocean Pulse program and Dr. Pearce is trying to establish coordination and cooperation in order to bring these research activities into the overall Pulse activities.

On 27 October, Dr. Pearce visited the Milford facility to discuss the current status of Ocean Pulse with members of the Division as well as with personnel from other Divisions interested in the Ocean Pulse program. Current-year task plans were also discussed and reviewed, particularly in regard to implementation of operational test phase Ocean Pulse activities.

Bori L. Olla was an invited plenary speaker at the Northeastern Animal Behavior Society meeting at Memorial University, St. John's, Newfoundland, where he delivered a paper entitled "Social Behavior as Related to Environmental Factors in the Tautog, Tautoga onitis." His paper covered such subjects as migratory behavior, reproduction, and effects of temperature.

Anne Studholme attended a US-USSR workshop on Physiology and Biochemistry of Aquatic Animals sponsored by the Belle W. Baruch Institute of the University of South Carolina at Georgetown, South Carolina.

### Manuscripts

- Pearson, W. H., and B. L. Olla. 1977. Chemoreception in the blue crab, Callinectes sapidus. Biol. Bull. 153: 346-354. (P)
- Haven, D. S., P. C. Kendall, and W. Phoel. 1976. A study of leased oyster grounds adjacent to the new and old James River Bridges, Newport News, Virginia. Report for the Virginia Department of Highways and Transportation. 15 pp. (P)
- Greig, R. A., and D. R. Wenzloff. Accumulation and depuration of metals by the American oyster. Bull. Env. Cont. & Toxic. (A)
- Greig, R. A., D. R. Wenzloff, C. L. MacKenzie, Jr., A. S. Merrill, and V. S. Zdanowicz. Trace metals in sea scallops from the eastern United States. Bull. Env. Cont. & Toxic. (A)
- MacKenzie, C., A. Merrill, and F. Serchuk. Sea scallop resources on Georges Bank and the Mid-Atlantic shelf. Mar. Fish. Rev. (A)
- Pearce, J., J. Caracciolo, R. Greig, D. Wenzloff, and F. Steimle, Jr. A study of Deepwater Dumpsite 106: Benthic fauna and heavy metal burdens in marine organisms and sediments. Proceedings of Marcus Wellenburg Foundation for International Cooperation in Science, First Symposium in Deep Sea Ecology. Lund, Sweden. (A)

### AQUACULTURE DIVISION

#### Spawning and Rearing of Mollusks Investigation

Juvenile surf clams, Spisula solidissima, held in our tank farm system have virtually ceased growth as ambient seawater temperatures reached 15°C in early November. Fluorometric readings of seawater indicate that the chlorophyll-a level has averaged 0.5 mg/m<sup>3</sup> as opposed to 30 mg/m<sup>3</sup> recorded in midsummer. The growth rate of these bivalves is highly dependent on natural algal food and temperature. Exploration into altering these variables may lead to a longer growing season.

Data indicate that the growth rate of Spisula over this past season was directly proportional to initial size. Growth curves have been constructed to serve as a predictive model to determine the time necessary for rearing the surf clam from egg to market. These curves show that seed animals, about 20 mm, planted in early June should attain a market size of 50 mm by late August.

In a recent early-development experiment with Spisula it was noted that charcoal-treated seawater inhibited development and caused a large number of abnormalities. Four treatments were established, charcoal-filtered water with and without antibiotic and natural water with and without antibiotic. Differences in survival between cultures with and without antibiotic were slight.

## Aquacultural Genetics Investigation

During the spring and summer of 1976, there were 36 spawnings of wild Crassostrea virginica adults which produced the foundation stock for a large-scale selective breeding experiment in which response to selection for rapid and slow growth is being measured. Ten of these spawnings produced viable spat, referred to as the 1976 year-class animals. These spat, reared under uniform conditions, have been measured and assigned to a high-growth line or a low-growth line according to their shell surface area. One-third of the 1976 year-class animals has been randomly assigned to a control group. As of October 1977, there are 10,959 oysters involved in this experiment; 3,770 in the high-growth line, 3,554 in the low-growth line, and 3,635 in the random control line. The average shell surface area in the high-growth line is 19.37 cm<sup>2</sup>, the average area in the low-growth line is 10.50 cm<sup>2</sup>, and the average area in the control line is 14.95 cm<sup>2</sup>. This represents a selection differential of +4.42 cm<sup>2</sup> for the high line and -4.45 cm<sup>2</sup> for the low line. The 1976 year-class animals will be the first generation of selected parents when they are bred during the spring of 1978 to produce the first generation of selected offspring.

## Aspects of Nutritional Requirements of Mollusks Investigation

Experiments conducted on reducing the concentration of supplemental enrichments in our algal growth medium are continuing. Flask cultures of six species (Monochrysis lutheri, Tetraselmis maculata, Isochrysis galbana, Isochrysis paradoxica, Dicrateria inornata, and Phaeodactylum tricornutum) all yielded high density populations. This medium contained a concentration of phosphate, nitrate, and vitamin, that was considerably reduced over that of the normal medium.

Several additional experiments on the culture of oyster larvae were conducted. Additional confirmatory information was gained on the effect on larval growth of seawater subjected to different treatments. We have begun collaborative studies with Dr. L. Provasoli of Haskins Laboratory and Yale University. This work will investigate the utilization of synthetic particle foods by oyster larvae.

The mass culture apparatus yielded a harvest of 1,072.5 liters of larval and 1,146 liters of juvenile foods this month. This is the fourth month that the algal culture apparatus yielded an excess of the food required in the laboratory. The requests from investigations were as follows: Aquacultural Genetics, 470 liters; Spawning and Rearing of Mollusks, 615 liters; Physiological Effects of Pollutant Stress, 176 liters. The subculturing of the strains in our algal collection has proceeded on schedule despite serious malfunctions in one of our incubators. Our recent efforts to purify the strain of Isochrysis, received from the Tahiti CNEOX station, of its ciliate contaminants appear to have been successful. At least, no ciliates are evident in cultures after 3 wk of incubation of a rapidly reproducing algal suspension.

## Meetings, Talks, Visitors, Publicity

Dr. William B. Nutting, Professor of Zoology, University of Massachusetts, and his invertebrate class visited Milford Laboratory on 11 October. They were provided a tour of the research investigations and a collecting trip on the Shang Wheeler.

Juvenile surf clams were supplied to Kahuku Farms, Walmonalo, Hawaii.

## PATHOBIOLOGY DIVISION

### Comparative Pathobiology Investigation

Two hundred oysters, Crassostrea virginica, from four areas of Delaware Bay were examined for the State of Delaware as part of the annual "MSX" survey. Minchinia nelsoni was detected in 44% of the oysters from the Bowers Beach area. "MSX" was not detected in the oysters from the other three areas, even though M. nelsoni was previously detected in oysters from those areas. Diagnostic services were provided to the town of Mashpee, Massachusetts, and Kahuku Farms in Honolulu, Hawaii. The histologic examination of heteropods, ctenophores, and chaetognaths collected on the July 1977, Deepwater Dumpsite 106 (DWD 106) cruise was completed. Two of sixteen heteropods had lesions resembling neoplasms. One lesion appeared to be an invasive, anaplastic proliferation originating from the kidney. The other lesion was a well-differentiated growth in the gonad. Both heteropods were from the acid dumpsite. Twenty-five percent of control and dumpsite animals had cells with enlarged, Feulgen-positive nuclei, suggestive of virus cytopathology. Two of the control animals had trematode infections. No substantive histological differences were noted in heteropods from the dump and control sites. Massive necrosis was observed in 85% of the ctenophores from the dumpsite and 25% of the ctenophores from the control site. The toxicity of the dumped material may be responsible for the necrosis observed in ctenophores from the acid dump site. Chaetognaths were not sectioned adequately for histologic examination. Myctophid fishes from DWD 106 sludge-dump and control sites were examined histologically. No significant lesions were noted in the animals examined, although sampling trauma was apparent in many animals. Myctophids from the acid dump site are being processed for microscopic examination. Writing continues on the monograph on the normal histology of the blue crab, Callinectes sapidus. All but two of the major sections, comprising 150 pages, are now complete in rough draft. Sections on the nervous system and the gonads are almost complete. Considerable time was spent instructing Ms. Jolly Hibbits (NWAFC, NMFS, Seattle, Washington) on techniques for handling, dissecting, processing, and examining tissues from the blue crab. Ms. Hibbits also was instructed on the comparative histology of the dungeness crab, Cancer magister, the species she will be studying in Seattle. During the month, the histology laboratory sectioned 1,153 blocks and stained 1,287 slides from a large variety of marine fishes, crustaceans, and mollusks.

### Disease and Environmental Stress Investigation

The annual report on fin rot disease studies of winter flounder, Pseudopleuronectes americanus, and "black gill" disease studies of the rock crab, Cancer irroratus, from the New York Bight, was completed and forwarded to the MESA project office. Transmission electron microscope analysis of blue crab chemoreceptors from crabs exposed to copper sulfate clearly shows that disruption of the integrity of the chemoreceptive sensilla occurs at several concentrations of the metal. Cytopathology was observed not only in crabs exposed to 1.0 mg/l of  $\text{CUSO}_4$  for 48 hr, but also in crabs exposed to 1.0 mg/l of  $\text{CUSO}_4$  for 24 hr, and crabs exposed to 100  $\mu\text{g}/\text{l}$  for 48 hr. Cytological damage is less, however, in crabs with less exposure to  $\text{CUSO}_4$ . Scanning electron microscope studies were conducted on winter flounder eggs experimentally exposed (Narragansett Laboratory) to 1.0 ppm of Bunker C fuel oil. The structure of the chorion was

examined in early (1-day) and late-stage (7-day) eggs. No differences were noted between experimental and control eggs. Resolution of the egg surface structure in 7-day eggs was difficult because of the dissolution of the chorion (which occurs prior to hatching). In cooperation with personnel of the Connecticut Department of Environmental Protection, a bacterium was isolated which is the probable cause of recent mortalities of striped bass, Morone saxatilis, from western Long Island Sound. The bacterium was isolated from spleen, liver, and kidney of two moribund striped bass. The organism is a Gram-negative rod (yet unidentified) and will kill young striped bass experimentally infected in the laboratory. Rock crabs for "black gill" studies were collected from Sandy Hook Bay, New Jersey, and the Philadelphia/Wilmington dumpsite located 35 mi offshore from the Delaware and Maryland coasts. In both collections, most of the crabs were approximately 1-yr old and ranged from 5.5 to 13 cm in carapace width. Histologic studies of gill epibionts are in progress. All data on "black gill" that have been obtained during the past 5 yr were collated to determine if sufficient numbers of crabs have been collected for each season of the year. The data were analyzed to determine the types of organisms present as well as the influence of sex, size, molt, and season. As of June 1977, 646 crabs from the New York Bight were examined microscopically.

#### Aquaculture - Control of Larval Disease Investigation

Florescent antibody methods for identification of bacterial pathogens in aquacultured organisms are being developed. Cell walls from the "red pseudomonad", a pathogen for oyster larvae, have been prepared by sonic disruption of the bacteria, differential centrifugation, and centrifugation through a sucrose density gradient. In the later technique the cell-wall fragments are separated from other cell constituents when they reach equilibrium at a specific level of sucrose density. These, and similarly prepared antigens, will be used to produce specific rabbit antibody for use in florescent antibody reactions.

Disease studies of the red pseudomonad via sonification of its cells, and challenge of these disrupted cells to fertilized oyster eggs continued. In the experiment, one batch of sonicated cells was stored frozen for a week and another batch was used immediately following sonification. Samples from these experiments are still being examined.

The red pseudomonad contains a fat-soluble, yellow pigment which remains after acetone extraction of the red portion. The pigment has been separated and assayed against fertilized oyster eggs to determine its effect. Samples were examined but the data are inconclusive. Red pigment from Serratia marcescens has been extracted and is being concentrated. A comparison test of the S. marcescens extract and the red extract of the red pseudomonad will be performed shortly.

At the request of the Prince Edward Island (Canada) Department of Fisheries, a visit was made to the Ellerslie Research Station to assess the effectiveness of a quarantine-effluent waste treatment system using ozone. Using total plate counts to test bacteriological sterility and an amperometric ozone analyzer, it was possible to verify the accuracy of residual ozone, and to demonstrate complete bacteriological kill at the ozone doses employed. A report on these findings was prepared and submitted to the PEI Department of Fisheries.

## Meetings, Talks, Visitors, Publicity

Dr. Rosenfield and Dr. Murchelano participated in the Aquavet student seminar, conducted at Oxford Laboratory on 1 October. Dr. Rosenfield and Dr. Murchelano attended a BLM meeting at Newark, New Jersey, on 6 October. Dr. Rosenfield visited the Milford Laboratory on 14 October where he held a staff meeting with members of the Pathobiology Division. Dr. Rosenfield attended the Sea Grant meeting held at University of Maryland, Horns Point, Maryland, on 18 and 19 October. On 20 October, Dr. Rosenfield attended the Maryland Oyster Resource Examination Committee meeting at Annapolis, Maryland.

Dr. Murchelano was a member of the review team for the annual OSG site visit to VIMS on 12-14 October. Dr. Murchelano attended the annual OSG site visit to the University of Maryland on 18 October.

Visitors to the laboratory during October included Mr. Howard C. Hankin, University of Maryland, College Park, Maryland; Dr. Maung Htun-Han, Fisheries Laboratory, Ministry of Agriculture, Fisheries, and Food, Lowestoft, United Kingdom; Mr. Jonathan Hager, Decatur, Georgia. The Oxford Laboratory hosted a 1-day meeting of the IYABA group on 13 October. On 26 October, Dr. Bang, Johns Hopkins University, Baltimore, Maryland, accompanied by W. Rowland Taylor and Ms. Talia Ramos, a student from Venezuela, met with Dr. Rosenfield, Dr. Johnson, and Mr. Farley. Ms. Ramos is planning to learn histological methods from our staff to develop methods for working with corals. Mr. Paul Eisen and Dr. Joel O'Connor, MESA New York Bight Project, Stony Brook, New York, met with Dr. Murchelano, Dr. Sawyer, and Ms. Sharon MacLean on 26 October. An informal committee meeting of the Fishery Climatology, Blue Crab Committee was hosted by the Oxford Laboratory on 26 October. Attendees were Dr. Herbert Austin and Dr. W. A. VanEngel from VIMS, Dr. Stephen Sulkin, University of Maryland, Horns Point Laboratory, Dr. Charles Epifanio, University of Delaware, Lewes, Delaware, Dr. M. C. Ingham, Director Atlantic Environmental Group, Narragansett, Rhode Island, and Dr. Rosenfield. On 28 October, Dr. C. R. Graham, Jr., Loyola College, Baltimore, Maryland, brought his marine and estuarine biology students to tour the Oxford Laboratory. Fred Kern hosted the meeting and provided a tour of the facilities.

Dr. Thomas Sawyer was awarded a 25-yr pin. The pin was presented with a suitable ceremony at the monthly staff meeting.

## Manuscripts

Bodammer, J. E. Hemocytes of the blue crab. J. Cell and Tissue Res. (A)

## NATIONAL SYSTEMATICS LABORATORY

### Benthic Fishes

Research continued on the taxonomy of North Atlantic rocklings. A comprehensive manuscript revision of the catsharks of the world (Scyliorhinidae) by Stewart Springer, who retired from NMFS several years ago, is in the final stages of preparation. Information on hake taxonomy was provided for the Office of Fisheries Development.

## Pelagic Fishes

Research continued on the systematics of Indo-West Pacific halfbeaks.

## Shrimps

A draft of a manuscript was nearly completed on anomalies or intersexes in the penaeid shrimp genus Penaeopsis.

## Other Crustaceans

Work progressed on preparation of a chapter on brachyuran crabs for a book on pollution ecology of estuarine invertebrates. Preparation continued on a guide to temperate-water decapod crustaceans of the US east coast.

## Meetings, Talks, Visitors, Publicity

The Editorial Board of the Sears Foundation for Marine Research series, "Fishes of the Western North Atlantic," had a meeting in Washington, D.C., which was attended by D. M. Cohen and B. B. Collette; a volume on Myctophidae will appear soon; other volumes are in preparation. The Estuarine Research Foundation Biennial Conference in Mt. Pocono, Pennsylvania, was attended by Austin Williams. National Illustrator's Meetings which were sponsored by the Association of Medical Illustrators and the Guild of Natural Science Illustrators and which were held in Baltimore were attended by Keiko Moore and M. M. Farfante; exhibits, techniques, and workshops were featured.

A seminar was presented at George Washington University by B. B. Collette, who discussed his participation in Tektite II.

Visitors included Dr. Walter Fischer of FAO - Rome who spent nearly the entire month working with NSL and other scientists on an extensive set of family and species identification sheets for fishery purposes covering the West Central Atlantic. Dr. Jean-Claude Hureau of the Muséum National d'Histoire Naturelle in Paris studied ophidioid fishes and Ms. Nancy Rabelais studied crustaceans.

## Other

A summary was prepared for the Director's office on NMFS field responses to a proposal from the American Fisheries Society to edit and publish the "Fishery Bulletin." Organizational work was done on a joint US-USSR workshop on the systematics of cold and temperate-water fishes.

## Manuscripts

Collette, B., and P. Bănărescu. Systematics and zoogeography of the fishes of the family Percidae. J. Fish. Res. Bd. Canada. 34: 1450-1463. (P)

Collette, B., et al. Biology of the percids. J. Fish. Res. Bd. Canada. 34: 1890-1899. (P)

Perez, Farfante, I. Range extensions of the shrimps Solenocera necopina Burkenroad and Parapenaeus americanus Rathbun (Crustacea, Decapoda, Penaeoidea). Proc. Biol. Soc. Wash. 90: 597-599. (P)

## ATLANTIC ENVIRONMENTAL GROUP

### Ocean Monitoring and Climatology Task Group

Two Data Analysis Products (DAP) were distributed to scientists of the Northeast Fisheries Center during October. DAP No. 5, which dealt with the temperature structure on the continental shelf and slope south of New England during 1974-1976, was a compilation of analyses prepared for the 1974, 1975, and 1976 Status of the Environment reports. DAP No. 6 was composed of graphical portrayals of sea-surface temperature and anomalies in Marsden Square 152-03 (40-41°N, 73-74°W) in the apex of New York Bight for the period of 1949-1976. These portrayals were prepared by the MARMAP Information System from data obtained from the Marine Deck at the National Climatic Center.

During the month of October, the AEG Ship of Opportunity Program obtained seven XBT transects. Of these, two were along 71°W across the southern New England shelf, three were out of the Port of New York, one out of Norfolk, and one out of New Orleans.

Steve Cook participated in a University of Rhode Island - Graduate School of Oceanography cruise on the Endeavor in support of an Undulating Oceanographic Recorder (UOR) frontal study being conducted by the MARMAP Field Group. Four extensive XBT transects were collected in support of the UOR operations. On two of the XBT transects, remnant shelf water was found to be entrained around or near the leading edge of eddy "R". One transect showed that the shelf water feature was at least 40 m deep in a band about 15 nautical miles wide.

### Ocean Dumping Task Group

Data from the July 1977 Albatross IV Cruise No. 77-05 to DWD 106 are presently under analysis. Physical oceanographic data have been digitized and portrayed as vertical sections through the operations area. Supplementary sections have been supplied from the physical oceanographic data collected aboard the Peirce.

A successful monitoring transect was completed aboard the tug Ocean Prince on 20-21 October. A test to collect zooplankton via a miniature net arrangement failed due to heavy weather.

Current drogues and two STD systems are being readied for cruise work at DWD 106 tentatively scheduled for 29 January through 4 February 1978 aboard the Albatross IV.

### Meetings, Talks, Visitors, Publicity

Reed Armstrong attended a workshop on the New Jersey Anoxia Event of 1976 Report at Stony Brook, Long Island, New York on 3-6 October.

An IYABA meeting was held in Oxford, Maryland, on 13 October and was attended by Reed Armstrong.

Mert Ingham and Woody Chamberlin traveled to NMFS headquarters on 13 October in Washington, DC, for a conference on the 1976 Status of the Environment Report.

Woody Chamberlin attended Oceans '77 Conference in Los Angeles, California, on 17 and 18 October, where he presented a paper (see below). He also attended part of the Climate Diagnostics Workshop at Scripps Institution of Oceanography and visited the NMFS LaJolla Laboratory on 19 October.

On 19 October Mert Ingham attended the first meeting of a steering committee to plan for a workshop on climate and fisheries to be held at the University of Rhode Island on 29-31 March 1978.

On 26 October Mert Ingham attended a conference at the Oxford Laboratory on blue crab climatology, attended by representatives of NMFS, Virginia Institute of Marine Science, University of Maryland, and University of Delaware.

#### Manuscripts

Chamberlin, J. L. 1977. Monitoring the effects of Gulf Stream meanders and eddies on the New England fishing grounds. In: Oceans '77 Conference Record, Vol. I, pp. 14D-1 to 14D-7. (P)

Chamberlin, J. L. 1977. Strong Gulf Stream eddy currents indicated by losses of crab traps on the continental slope. Abstract submitted for Informal Workshop on Physical Oceanography and Meteorology of the Middle Atlantic Bight and New York Bight, 15-16 November, 1977. (A)

Cook, S. K. In Press. Gulf Stream interaction with shelf water in the Cape Hatteras area. Gulfstream (NOAA). (A)

Ingham, M. C., S. K. Cook, and K. A. Hausknecht. 1977. Oxycline characteristics and skipjack tuna distribution in the southeastern tropical Atlantic. Fish. Bull. 75(4). (A)

Ingham, M. C. 1977. Efforts of the Atlantic Environmental Group to construct an environmental data base for fishery climatology studies in the Cape Cod-Cape Hatteras area. Abstract submitted for Informal Workshop on Physical Oceanography and Meteorology of the Middle Atlantic Bight and New York Bight, 15-16 November 1977. (A)