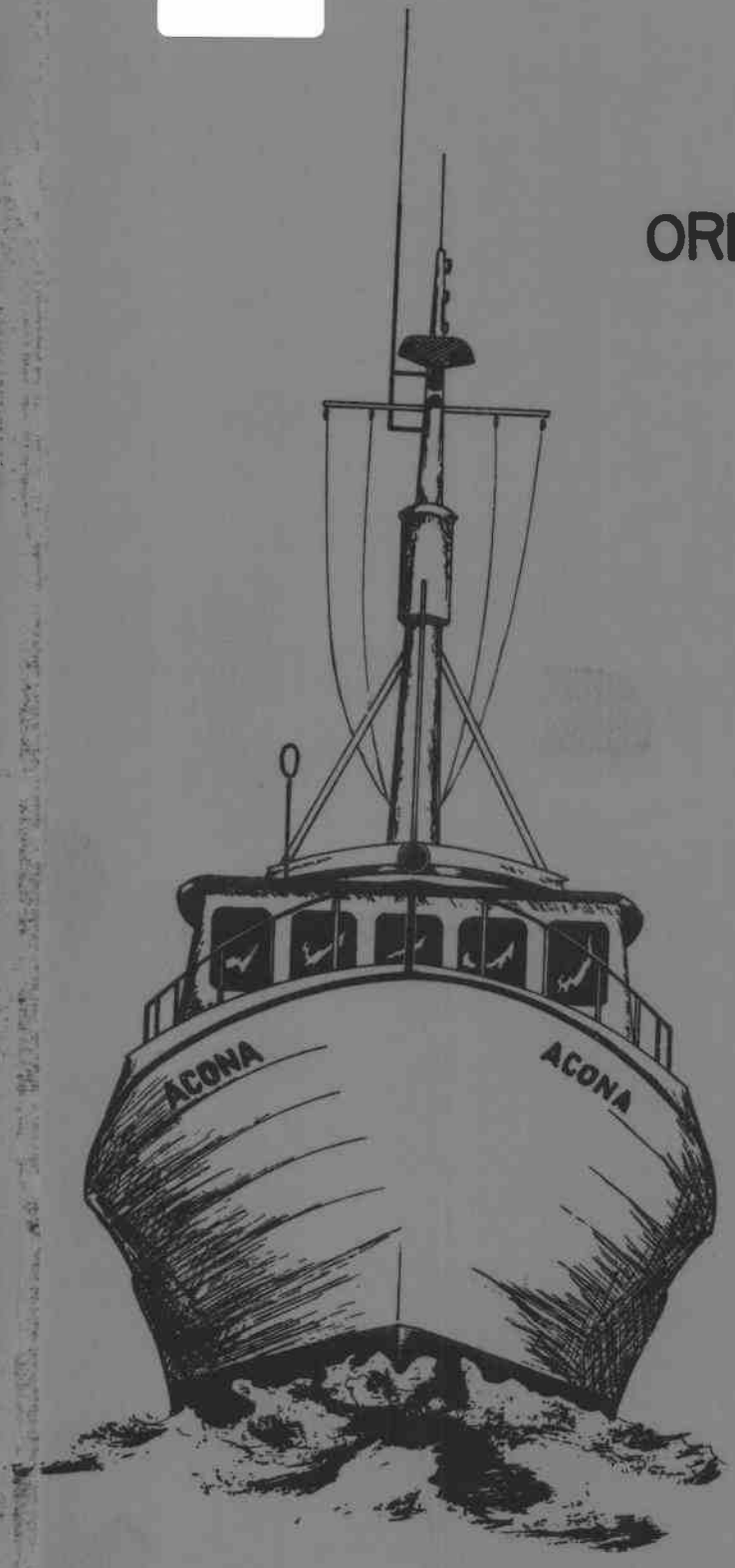
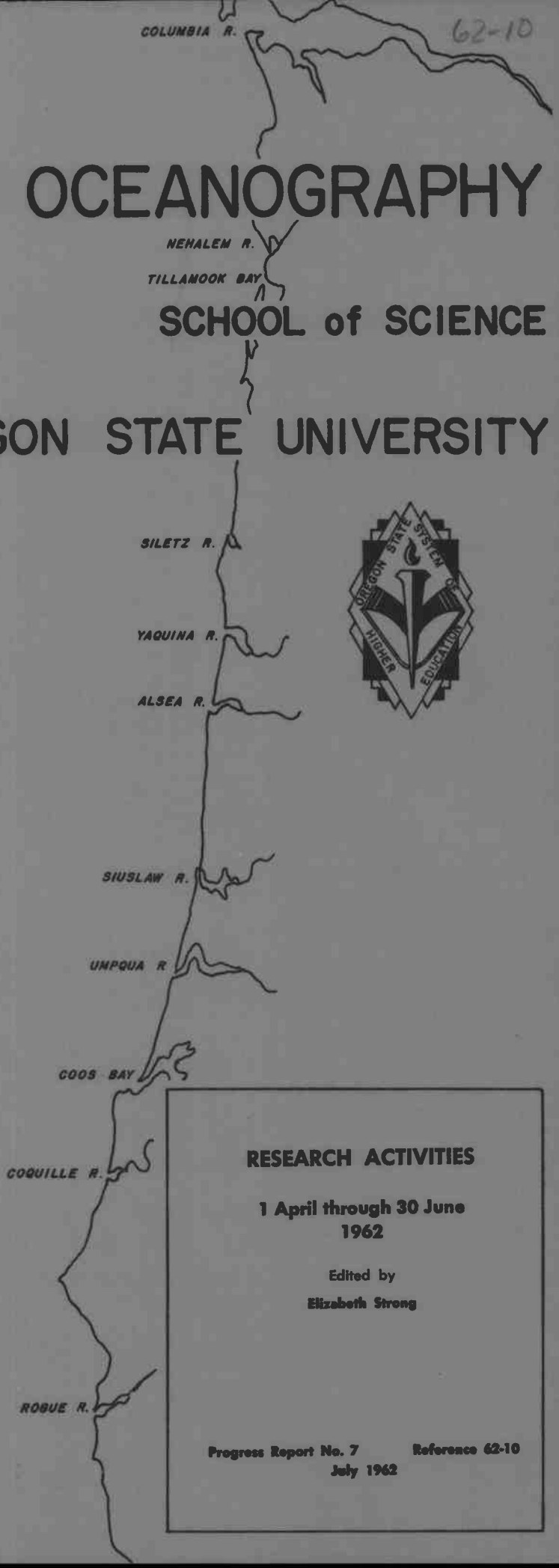
DEPARTMENT of OCEANOGRAPHY

SCHOOL of SCIENCE

OREGON STATE UNIVERSITY





RESEARCH ACTIVITIES

1 April through 30 June 1962

Edited by

Elizabeth Strong

Progress Report No. 7 Reference 62-10
July 1962

Department of Oceanography
School of Science
Oregon State University

[School of Oceanography.

Wayne V. Burt
Chairman

Progress Report No. 7

RESEARCH ACTIVITIES

During the Period
1 April through 30 June 1962

Edited by

Elizabeth Strong

Office of Naval Research
Contract Nonr 1286(02)
Project NR 083-102

National Science Foundation
Grant No. G 19783
Grant No. G 23103

Atomic Energy Commission
Contract AT (45-1)-1726

Advanced Research Projects Agency
Grant No. AF-AFOSR-62-376

Reference 62-10
July 1962

INTRODUCTION

This report summarizes the research conducted by the Department of Oceanography, Oregon State University, during the second quarter of the calendar year 1962 under contract Nonr 1286(02) Project NR 083-102 with the Office of Naval Research, grants G 19783 and G 23103 with the National Science Foundation, contract AT (45-1)-1726 with the Atomic Energy Commission, and grant AF-AFOSR-62-376 with the Advanced Research Projects Agency.

PHYSICAL OCEANOGRAPHY

Hydrographic Survey of Oregon Coastal Waters -- Wyatt, Kujala, Oliphant

Three hydrographic cruises were made during the quarter. The cruise from 2 to 6 April consisted of lines of stations to 165 miles west of Newport and Coos Bay. From 30 April to 3 May, a line of stations was run off Newport. The hydrographic cruise from 4 to 17 June included lines of stations off Astoria, Newport, Coos Bay, and Brookings.

One drogue station 50 miles west of Newport was occupied from 30 May to 1 June. Current measurements were made with parachute drogues placed at depths of 0, 50, 100, 150, 200, and 1,000 meters.

Summary of Samples Taken on Hydrographic Cruise*

Hydrographic Casts	85
BT Casts	142
Surface Temperature and Salinity Observations	186
Drift Bottle Releases	983
Clarke-Bumpus Plankton Tows	54
Midwater Trawl Tows	16
Night Light Stations	1
Phytoplankton Samples	267
Drogue Measurements of Currents	7

Shore Station Observations -- Oliphant

Temperature and salinity observations are being continued at 11 locations along the Oregon coast and at one location in Northern California. Shore stations will be visited during the next quarter.

*See also FACILITIES

A report summarizing shore station observations for 1961 is in the final stages of preparation and will be ready for distribution shortly.

Temperature Variability Studies -- Denner, Pattullo

Daily surface data were collected throughout most of the quarter at the Newport and Oceanlake stations. Both of these stations are occupied by public school classes and will be discontinued during the summer vacation. Mr. Denner is on leave from the University during the summer quarter; he has accepted employment in the Oceanographic Section of China Lake Naval Station for this period. The work will be re-instituted in the fall, when Mr. Denner returns to campus.

Water Masses off the Oregon Coast -- Rosenberg, Pattullo

The analyses of data are complete and the report is being written. It will be completed within the next quarter.

GEOPHYSICAL OCEANOGRAPHY

Seismic Work at Sea -- Rinehart, Berg

Shallow water seismic reflection equipment has been received. Plans are being made for an initial survey in the vicinity of Newport, using a sparker-gas exploder unit with a continuous seismic recording system.

A seismic recording oscilloscope has been obtained from surplus and plans are being made to build a seismic unit for refraction study.

Standard Seismological Station -- Berg, Trembly, Mecham

The U. S. Coast and Geodetic Survey has provided and installed equipment for a standard seismological station. This was received the last week in June and is now housed in the OSU seismic vault near Corvallis.

The vault has been renovated to improve temperature stability and the over-all capability of the system in that location.

A trial period of operation will be initiated during the next few months.

Oregon Earthquakes -- Baker, Berg

Data on earthquakes in Oregon from 1841 through 1958 have been compiled and analyzed. A manuscript has been completed and will be submitted for publication in the near future.

Coastal Gravity Range -- Rinehart, Berg

Arrangements have been made to use the Coast Guard cutter MODOC to institute a gravity range. The survey area located off Newport is 10 miles square with 1 mile grid spacing of stations. This work will commence in early July and is expected to continue until fall 1962.

Mr. Rinehart spent a week at the LaCoste-Romberg Company in Texas in May to become familiar with the use of the underwater gravity meter.

Gravity Transition from Deep Ocean to Continent -- Rinehart, Berg

Initial analysis of existing data has been completed for a single line of gravity stations in terms of the transition from deep ocean to continent. The line of stations extends from about 200 miles west to about 200 miles east of Coos Bay. A general review of the method of analysis is now being made. Land profiles will be supplemented with new stations where needed for improved analysis.

It is planned to give a report of this study at the Western National Meeting of the AGU in Seattle next November.

Gravity Stations in Oregon -- Rinehart, Gaskell, Berg

Gravity stations in Oregon that were taken by Dr. George Woollard's group at the University of Wisconsin have been made available to Oregon State University. These data are currently being reduced and plotted on a map of Oregon. Plans are being made for additional land gravity work.

Sea Gravity Measurements -- Berg

Preliminary plans are being made to conduct a sea-gravity study in spring, 1963. Captain Kellogg of ONR, San Francisco, is assisting us in our effort to procure the use of a vessel suitable for this work. He has set up a meeting at Corvallis in August to discuss the possibility of using a Coast Guard vessel.

The principals at this meeting will be ONR (Capt. Kellogg), Coast Guard officials, and Oregon State University officials (Drs. Burt and Berg).

Data Analysis -- Rinehart, Gaskell, Berg

Gravity data reduction programs have been prepared for the IBM 1620. Gravity data are being indexed on punch cards. Initial considerations

are being given to check several methods of analysis of gravity data using theoretical two- and three-dimensional gravity models.

Computer programs have been prepared for theoretical seismic problems.

Magnetic and Electrical Study -- Berg

An effort is being made to obtain the loan of a magnetometer to tow behind a vessel. The local program will be to fill in the gap in the regional magnetic coverage only. Any work conducted in magnetics will be done in cooperation with other organizations interested in these measurements.

Thermal Studies -- Berg

Initial plans for heat flow measurements off the Pacific northwest coast are 1) to make the area of the gravity range a standard calibration range for geophysical measurements and to study heat flow measurement techniques in that area; and 2) to make a preliminary reconnaissance survey of heat flow off the Oregon coast.

Theoretical Seismological Studies -- Papageorge, Berg

The displacement function amplitude versus energy of exploding charge has been studied. A derivation for the displacement function has been studied. A derivation for the displacement function has been completed for different pressure functions as follows: (1) zero rise, infinite decay, (2) zero rise, finite decay, (3) finite rise, infinite decay, (4) finite rise, finite decay. Preliminary results indicate that the function with the finite rise and infinite decay time will best approximate the experimental displacement function of GNOME SOURCE.

Seismic Model Research -- Redo, Trembly, Berg

The first two weeks of June were spent doing library research. Emphasis was placed on two-dimensional seismic modeling and the propogation of waves through an elastic medium. The works of Press, Oliver, Ewing, Miller, and Carlin proved most helpful. Plans have been formulated for conducting studies. The model is expected to be operating in September.

GEOLOGICAL OCEANOGRAPHY

Geology of the Oregon Continental Terrace -- Byrne, Bushnell, Maloney, Kulm

Size analyses have been completed for the 129 sediment samples collected from the continental shelf and slope between 43°30'N and 45°00'N, and a

sediment type distribution chart has been prepared. Heavy mineral separations are being made, and both heavy and light fractions are being examined petrographically. Preliminary examination reveals that the mineralogy is relatively uniform in the nearshore area and is similar to the mineralogy of the beach sands.

A preliminary smooth sheet has been prepared for the continental slope and outer shelf from 44°04'N to 44°36'N from PDR traces made along east-west lines at 1.5-mile intervals. The details of slope geomorphology will be evaluated from this chart.

The Ewing-type piston corer has been made operable and will be tested during July. It will be used to collect cores from Astoria Canyon and Astoria Cone during August.

Coastal Deposition -- Byrne, Maloney

Heavy mineral separations have been made to determine areas of heavy mineral concentration for 88 samples of beach sand taken from between Newport and Beaver Creek, seven miles south of Newport. The greatest concentrations of heavy minerals (up to 50 per cent) occur near the back of the beach and near the mouths of small creeks.

CHEMICAL OCEANOGRAPHY

Ion Exchange Resin Chromatography -- Park, Latimer

Ion exchange resin chromatography has been used for the separation of various dissolved chemical species. Results indicate that divalent cations, Mg, Ca, and Sr, are easily separated from the original sea water mixture. We are now attempting the separation by a single elution process of monovalent cations, Na and K.

Radioanalyses of Marine Organisms -- Osterberg

Research on the radioactivity of marine organisms which was initiated as a Ph.D. topic will be continued. Zinc-65, and the fission products zirconium-95-niobium-95, ruthenium-103, and cerium-141 were readily detectable in euphausiids taken from the ocean off Oregon.

A multichannel gamma-ray spectrometer and related equipment has been ordered as a first step in expanding this program in radioecology, which was initiated a year ago.

Total CO_2 Determination -- Freund, Park

Conductometric determination of total CO_2 in seawater is under way. Preliminary tests indicate that this new method has an accuracy of ±1 per cent or better. This work is a joint project with the Department of Chemistry.

Surface Area and Porosity of Marine Sediments -- Stump

The sediment samples obtained from off Stonewall Bank at depths from 50 to 200 fathoms have been analyzed for their surface area. All surface areas were determined by the B.E.T. adsorption method, using both nitrogen and water vapor. Samples were vacuum-dried at 80°C and ground to pass through a #200-mesh screen. Comparisons were made between the raw samples and the samples after electrodialysis.

The table below gives a summary of the results.

Sample	Depth	Surface Areas in Square Meters/Gram			
No.	Fathoms	Raw Samples		Electrodialyzed Samples	
		N_2	H_2O	N_2	H_2O
6107-93	172	13.5 ± 0.7	48.5 ± 2.5	24.9 ± 1.3	54.5 ± 2.7
6107-95	119	17.0 ± 0.9	58.0 ± 3.0	27.0 ± 1.4	64.5 ± 3.3
6107-9	53	40.0 ± 2.0	99.5 ± 5.0	51.4 ± 2.1	135 ± 7.0
6107-110	195	53.0 ± 2.6	125.0 ± 6.3	76.0 ± 4.0	148 ± 7.5
6107-29	77	12.7 ± 0.7	42.3 ± 2.2	20.6 ± 1.0	42.4 ± 2.2
6107-14	81	14.0 ± 0.7	50.8 ± 2.6	26.8 ± 1.4	64.5 ± 3.3
6107-42	117	15.2 ± 0.8	53.0 ± 2.6	28.0 ± 1.4	64.5 ± 3.3

BIOLOGICAL OCEANOGRAPHY

Plankton Inventories -- Frolander

Samples were collected on eight sampling days between 1 April and 30 June at four stations in Yaquina Bay. The following data were obtained this quarter:

Physical data:

Surface and bottom water samples at each station, from which temperature, salinity, and dissolved oxygen have been measured. Total of 64 measurements of each variable.

Biological data:

Quantitative net tows

# 6 mesh tows	32
#12 mesh tows	32

Qualitative half-meter net tows 16

Samples were collected weekly at two stations in Yaquina Bay during the period January 1960 through June 1961. Graphs have been plotted, showing number of organisms per cubic meter of water for seven major species of zooplankton. Data on all the zooplankton forms commonly present during the period June 1960 through June 1961 have been reduced and tabulated to show numbers of organisms per cubic meter of water. Analysis and interpretation of the data is in preparatory stages for manuscript writing.

Previously Unreported Copepod -- Frolander

Study of a copepod previously unreported for this area has been continued to determine the seasonal distribution of this organism. The first specimens of the year 1962 were taken on 20 June at one of the two new upstream stations in Yaquina Bay. These stations were added to our sampling program because of the discovery of the organism in a special sampling series of August, 1960. (See Progress Report No. 6, p. 5. Date of first appearance reported as August, 1961, in error.)

As far as we can determine from the sampling to date, the seasonal distribution of this form is not different from the seasonal distribution of a similar copepod found in East Coast waters. Additional stations are planned in the area where these organisms are found to learn more of their distribution in the bay and the environmental factors influencing them.

Oceanic Nekton Studies -- Pearcy, Laurs

This quarter 40 more collections of nekton were made off the Oregon coast with the Isaacs-Kidd midwater trawl. A total of 187 samples have been taken at standard stations during the past year. Over 50 species of fishes, mainly mesopelagic species, have been identified. Myctophidae are the most numerous fish in nearly all collections, particularly Lampanyctus leucopsarus, Diaphus theta, and Tarletonbeania crenularis, which are abundant within the upper 200 meters at night.

Distribution with depth was as follows: T. crenularis most abundant in the upper 10 meters, D. theta most abundant between 10 and 25 meters, and L. leucopsarus most abundant between 25 and 30 meters.

About ten species of fishes, including several species of Cyclothone and Bathylagus, were taken only in tows made to 500 meters or deeper, and thus are considered deep-water forms.

Cephalopods, sergistids, and carid shrimp are currently being identified. About ten species of squid have been found in our collections, including several not previously reported from the northeastern Pacific.

A study of sampling variability was made at one station. Aggregation or patchiness was indicated only when the number of fish collected per tow was high.

Macroplankton Studies -- Renshaw, Hebard, Hubbard, Pearcy

Samples from a total of 187 midwater trawls have been partially analyzed for oceanic macroplankton. After the nektonic organisms were removed, the sample was split with a plankton splitter and the subsample then sorted into animal groups for identification. The unsplit portion of the sample is re-examined for rare planktonic forms.

A partial list of the species that have been identified to date includes: 7 species of euphausiids with Euphausia pacifica the most abundant species; 21 species of copepods; 5 species of tunicates; 4 species of mysids; 3 species of pteropods; 15 species of medusae; 9 species of siphonophores, 4 of which represent new distributional records; and 11 species of chaetognaths, one of which is a new northern distributional record.

Further analysis of the organisms will be carried out with respect to seasonal, vertical, and horizontal distribution.

Epibenthic Fishes -- Day, Pearcy

A total of 47 otter trawl drags have been made for the purpose of studying the species composition and bathymetric distribution of benthic fishes off the Oregon coast. The main sampling area is located on a line perpendicular to the coastline at Waldport, Oregon. The sampling gear is a 22' gulf-style shrimp trawl with $1\frac{1}{4}$" stretch mesh. Samples were taken during the summer, fall, and winter seasons in the depth range from 20 to 1000 fathoms. The sampling program for this study has been completed.

To date, a total of 43 species of fishes from 16 families have been identified from the otter trawl samples. The depth distribution as shown by the samples has been recorded for each species of fish.

The identification of the coryphaenoidid fishes, common in deep tows, is currently being undertaken.

The stomachs of 71 Sebastodes elongatus were analyzed for food content. The main food items found in the stomachs were Pandalus jordani, Boreomysis, and Calanus.

Benthic Fauna -- McCauley

Collections made during May and June have brought the total number of otter trawl samples to 48 and the number of biological dredge samples to 30. About two-thirds of the samples collected have been sorted and 1097 lots of specimens have been accessioned. Of these, 319 lots have been identified and tentatively verified, with 138 species found represented. Approximately half of the lots accessioned were molluscs or echinoderms. Molluscan species were somewhat more numerous, but in a number of individuals the echinoderms (especially the ophiuroids) greatly exceeded the molluscs.

An ellobiopsid parasite of shrimp has been identified and a research note submitted. The taxonomic affinities of this group of parasites have not yet been established. Some consider the group to be closely related to the parasitic peridinians while others place it close to the fungi. This group of organisms has previously been reported only from the Skagarak and Straits of Magellan. This constitutes the first occurrence of the group from the Pacific.

Benthic Ecology -- Carey

Quantitative benthic sampling was performed on the Newport line of stations. Collections obtained from a deep-sea anchor dredge, constructed from W.H.O.I. plans, are being analyzed. Preliminary results will be used to establish location of permanent stations for future sampling. Techniques are being studied and equipment built to make the method of sediment washing on board ship more quantitative.

Phytoplankton Ecology and Physiology -- Curl, Small

A. Primary Production.

An in situ station (NH-25) was occupied 18 April and 10 May from dawn until dark. This station will be occupied one day per month throughout the year. The C^{14} method was used to analyze primary production at five depths (surface to photic depth) approximately at sunrise, mid-morning, noon, mid-afternoon, and late afternoon. Production-depth profiles indicate that maximum production occurred at noon both dates. (11.66 $mgC/m^3/hr$ at 25 meters on 18 April and 24.99 $mgC/m^3/hr$ at 10 meters on 10 May). High surface inhibition was encountered at this time of day. Production values were all higher in May, indicating spring bloom conditions.

Samples for pigment analysis and analysis of species composition were taken concurrently with the sunrise, noon, and mid-afternoon primary production samples for the five depths. Incident and attenuated light in the sea was monitored on both dates throughout the "daylight day" by submarine photometer.

Samples for species composition analysis were taken at the surface and 10 meters at all 11 stations on the Newport line and at the surface at AH-15 and AH-5, on 2 to 6 April. On the cruise of 30 April to 2 May on the Newport line alone, a total of 55 pigment samples and 24 fixed samples for species identification were collected and processed. Incident and attenuated light was monitored, so that the Ryther and Yentsch method of estimating organic production with chlorophyll and light data could be used and related to data from the in situ station.

The Newport-Astoria cruise of 4 to 7 June indicated bloom conditions still prevailed. A total of 78 pigment analyses and 23 species composition analyses were made. Light measurements were made throughout the daylight periods.

A cruise was made 13 to 15 June on the Brookings line, to obtain phytoplankton data under pre-upwelling conditions (hydrographic data indicated that upwelling already had begun, but biological data indicated that it had started a short time before the cruise). Forty-nine pigment samples were collected and are currently being analyzed. Light measurements were taken.

B. Radioanalysis of Phytoplankton

Phytoplankton for radioanalysis were collected on two cruises by filtering large volumes of water through 5"-diameter membrane filters. The chlorophyll "a" and carotenoid content of each filter sample also was determined. Ten such samples were collected off Astoria on 6 April (averaging about 35 liters filtered per sample), and seven samples were collected at the same general location on 7 June (averaging about 50 liters filtered per sample). These data are taken to complement the program of Charles Osterberg, which deals with radioanalysis of certain second trophic level herbivores.

Grazing and Energy Transfer in Lower Trophic Levels -- Small, Curl

Construction of the light-gradient, temperature-gradient "aquastat" should be completed this following quarter. The cooling mechanism for the culture room has been modified so that sufficiently low temperatures can be maintained throughout the summer months.

Graduate Training -- Curl, Small

A Public Health Service grant was received to support three pre-doctoral fellows in phytoplankton research and to equip a teaching laboratory. Three courses dealing with phytoplankton ecology, phytoplankton physiology, and primary production will be offered next school year.

FACILITIES

Oceanography Building

Pre-preliminary plans for the building prepared by Jeppsen and Miller, Architects, consist of a four-floor building with an area of 7,164 square feet on each floor, plus 800 square feet of mechanical space (roof), or a total of 29,456 feet of usable space. Space is allocated for offices and laboratories for work in physical, geophysical, geological, chemical, biological, and microbiological oceanography. Administrative offices, an electronics shop, a light machine shop, and a small entrance foyer with suitable oceanographic display space are included. The State Board of Higher Education has approved these pre-preliminary plans.

Research Vessel ACONA

The ACONA was at sea a total of 39 days during the quarter. An open house for the general public was held in Newport from 4 to 8 May and the ship was in dry dock from 14 to 26 May.

Cruises taken during the quarter are as follows:

Cruise Type	Dates	Nautical Miles
Hydrographic	2 to 6 April	580
Midwater trawl	10 to 12 April	140
Dredging	16 to 17 April	110
Hydrographic	30 April to 3 May	330
Midwater trawl	8 to 11 May	175
Drydock (Portland)	14 to 26 May	450
Hydrographic (Q casts)	27 May	50
Drogue	30 to 31 May	200
Hydrographic	4 to 17 June	1,350
Dredging	20 to 22 June	240
Geology (PDR)	25 to 26 June	211
Total nautical miles		3,836

In addition to observations made during hydrographic cruises, the following samples were taken:

Meter net tows	4
Midwater trawl tows	25
Biological dredge hauls	18
Anchor dredge hauls	5
Otter trawl tows	3
Depth soundings (Detailed soundings over 120-mile track)	
Primary production measurements	12

Marine Science Laboratory

A plan has been submitted to the Area Redevelopment Administration, of the Federal Government, for funds to establish a Marine Science Laboratory on the Newport Tract on Yaquina Bay. Laboratory plans have been drawn by members of the staffs of the Department of Oceanography and other interested departments on campus. The building as proposed has three wings. One wing (Oceanography) would be principally laboratories and shops, with a few small cubicle-type offices, for a total of 12,129 sq. ft. The other two wings would house laboratories for studies of water resources fisheries (11,423 sq. ft.) and a public wing with museum, library, and auditorium (10,432 sq. ft.).

STAFF

Dr. Richard Y. Morita has joined the staff with the rank of Associate Professor. This is a joint appointment between the department of Microbiology and Oceanography.

Dr. Morita received his B. S. in Bacteriology-Chemistry from the University of Nebraska in 1947, and his M. S. in Bacteriology from the University of Southern California in 1949. In 1954 he was awarded the Ph.D. in Microbiology-Oceanography by the University of California.

For six years he was associated with Scripps Institution of Oceanography, investigating bacteria of the deep sea. This work took him on several major expeditions, including the Mid-Pacific Expedition to Bikini in 1950, the Trans-Pacific Expedition in 1953, and the Danish GALATHEA Expedition (1952), on which he served as Visiting Investigator. His papers with Dr. Claude E. ZoBell on their collections of deep sea microorganisms have attracted international attention.

On completion of his post-doctorate work at Scripps, Dr. Morita accepted an assistant professorship of biology at the University of Houston, after which he became Assistant Professor of Bacteriology and Associate Professor of Microbiology at the University of Nebraska.

He has numerous scientific papers and other contributions. One of his principal interests has been the effect of hydrostatic pressure on marine organisms, an interest which he plans to continue on the Oregon State Campus and at sea. Research will be continued on the cytology, enzymology, taxonomy, etc. of the Beggiatoa species, and in addition, studies dealing with the microbe's contribution on the diagenesis of sedimentary material will be initiated.

Mr. Charles L. Osterberg has joined the staff with the rank of Instructor. Mr. Osterberg has completed all requirements for the Ph.D. degree in Oceanography here at Oregon State, except for the defense of dissertation. This will be completed during the summer term. Mr. Osterberg received his B. S. in Physical Science from Arizona State College in 1948, and an M. A. from the same institution in 1949. He attended a Summer Institute in Radiation Biology at Purdue University in 1958, under A.E.C. sponsorship, and attended the Friday Harbor Marine Laboratory (U. of W.) Summer Session in 1960 as an NSF fellow. His work at Oregon State has been supported by a Predoctoral Fellowship from the U. S. Public Health Service.

He served for six years on the staff of the Lowell Observatory, working on the "Solar Variations" program of the U. S. Weather Bureau and Air Force. He then joined the staff of the Atmospheric Research Observatory of Arizona State College, and was associated for three years with the infra-red program sponsored by the Air Force.

His thesis, "Radioactivity in Oceanic Organisms," which was carried out with the cooperation of Hanford Laboratories, includes his findings on artificial radioactivity in the marine life off the Oregon coast. He will continue this work as a staff member.

In addition to being a co-author of a research paper while at Arizona State College, he has a paper "Zinc-65 in Salps and Euphausiids" accepted for publication in 1962 in Limnology and Oceanography, and has submitted another, "Fallout Radionuclides in Euphausiids," for publication.

Dr. Peter Dehlinger will join the staff of the Department of Oceanography at OSU as Professor of Geophysics after September 1962.

PUBLICATIONS AND PAPERS

Published:

Byrne, John V., 1962. Geomorphology of the continental terrace off the central coast of Oregon. The Ore-Bin, 24: 65-74.

Hood, D. W. and Kilho Park, 1962. Bicarbonate utilization by marine phytoplankton in photosynthesis. Physiologia Plantarum, 15: 273-282.

Pearcy, W. G. 1962. Ecology of an estuarine population of winter flounder Pseudopleuronectes americanus (Walbaum). I. Hydrography of the Mystic River Estuary. Bull. Bingham Oceanogr. Coll. 18(1): 5-15.

Pearcy, W. G. 1962. Ecology of an estuarine population of winter flounder Pseudopleuronectes americanus (Walbaum). II. Distribution and dynamics of larvae. Bull. Bingham Oceanogr. Coll. 18(1): 16-38.

Pearcy, W. G. 1962. Ecology of an estuarine population of winter flounder Pseudopleuronectes americanus (Walbaum). III. Distribution, abundance, growth and production of juveniles; survival of larvae and juveniles. Bull. Bingham Oceanogr. Coll. 18(1): 39-64.

Pearcy, W. G. 1962. Ecology of an estuarine population of winter flounder Pseudopleuronectes americanus (Walbaum). IV. Food habits of larvae and juveniles. Bull. Bingham Oceanogr. Coll. 18(1): 65-78.

Pearcy, W. G. and S. W. Richards. Distribution and Ecology of fishes of the Mystic River Estuary, Connecticut. Ecology, 43: 248-259.

Pearcy, W. G. A tail-less flounder. Trans. Amer. Fish. Soc., 91: 233-234.

Submitted for Publication:

Curl, H., Jr. The effect of divalent sulfur and vitamin B_{12} in controlling the distribution of Skeletonema costatum. Limnol. Oceanogr.

Kitano, Y., Kilho Park, and D. W. Hood. Pure aragonite synthesis. Journal of Geophysical Research.

McCauley, James E. Ellobiopsidae from the Pacific. Science.

Osterberg, C. Zinc-65 in Salps and Euphausiids. Limnol. Oceanogr.

Osterberg, C. Fission Radionuclides in Euphausiids. Science.

Park, Kilho; June G. Pattullo and Bruce Wyatt. Chemical properties as indicators of upwelling along Oregon coast. Limnol. Oceanogr.

Pearcy, W. G. Distribution and origin of demersal eggs with the order Pleuronectiformes. J. du. Conseil.

Pearcy, W. G. A large leptocephalus. Cover of Science.

Pearcy, W. G. Egg masses and early developmental stages of the scorpaenid fish, Sebastolobus. Jour. Fish. Res. Bd. Canada.

Small, L. F. Preliminary studies on the use of radioisotopes in laboratory energy assimilation studies with Daphnia. Nature.

Wyatt, Bruce. A short-tailed Albatross, Diomedia albatrus. Sighted off the Oregon Coast. The Condor.