

# **NEW ENGLAND ESTUARINE RESEARCH SOCIETY**

## **SPRING MEETING**

**May 2-4, 1974**

**Marine Biological Laboratory  
Woods Hole, Massachusetts**

## **ABSTRACTS**

[NOTE: The abstracts for the papers presented at this meeting were never printed and made available to participants, and they have never been seen since that time by anyone other than myself. What you will find here is a compilation of the original submissions as mailed by presenters to the Program Chair of the meeting. – NEERS Historian, March 2006]

UNIVERSITY OF RHODE ISLAND  
KINGSTON • R. I. 02881

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Graduate School of Oceanography • Narragansett Bay Campus

NEERS - 1974 Spring Meeting

NAME: Arthur G. Gaines, Jr

TITLE: Tidal features of a drowned glacial landscape.

Abstract: The Pettaquamscutt River, Rhode Island, is an arm of the sea whose bathymetry was determined primarily by glacial and late-glacial processes during a lower stand of sea level. Within the past 1700 years, since marine inundation of the landscape, modifications have resulted from coastal and paludal processes and human activities.

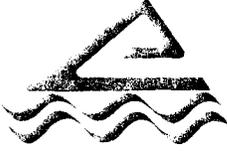
Three tide gauges were maintained along the River for a period of ten months to define the tidal features and modifications associated with the unusual geometry of this estuary. The importance of storm surges, longer term variations in sea level and increasing upstream distortion of the ocean tide wave is discussed.

COASTAL CIRCULATION IN THE WESTERN GULF OF MAINE

by Allan D. Hartwell, Physical Oceanographer  
Normandeau Associates, Inc., Bedford, NH 03102

ABSTRACT

Extensive hydrographic studies off the New Hampshire coast to delimit nearshore water mass dynamics and net circulation patterns have been in progress since September 1972. The program has included continuous monitoring of water currents and temperature for more than a year at 12 in-situ moorings located out to 4.5 miles offshore, continuous monitoring of local winds and tides, periodic 13 hour anchor stations, streamer observations, drogue tracking, biweekly slack water runs, and monthly drifter releases. These studies document the dynamic nature of nearshore coastal areas. About 50% of the year weak reversing tidal currents are dominant with flood to the north and ebb to the south, parallel to the shoreline. These conditions are especially common during the summer when winds are light and variable. Strong winds during stormy periods set in motion near surface shear flows which can dominate the water column and mask out the tidal flows. About 25% of the year flows are southward due to northeasters lashing the coast; at such times current speeds may reach 1 knot. During the remainder of the year, especially late fall and winter, flows are northward due to periods of southwesterly winds and possible breakdown of the Gulf of Maine gyre into a clockwise eddy from Cape Ann northward.



## Normandeau Associates, Inc.

686 MAST ROAD • MANCHESTER, NEW HAMPSHIRE 03102 • (603) 669-7911

DONALD A. NORMANDEAU, PH.D.  
JOHN D. DAVIS, PH.D.

26 March 1974

Dr. M.B. Abbott, Conference Chairman  
Marine Biological Laboratory  
Woods Hole, Massachusetts 02143

Dear Dr. Abbott:

I am submitting the following paper for presentation at the  
NEERS--1974 Spring Meeting:

The Shallow-Water Benthic Community off the New Hampshire Coast

### Abstract

An intensive sampling of the benthos off of Hampton Beach, N.H. was conducted during the summer and fall of 1972. Both hard and soft substrates were sampled in depths from 10 to 70 feet using a diver-operated hydraulic dredge.

The advantages of this sampling device for sampling coastal and estuarine communities include:

- 1) The ability to sample hard substrate as well as soft substrate subtidal communities;
- 2) The diver can observe and collect motile epifauna which otherwise might escape a grab sampler;
- 3) A known sample size is taken. It is not affected by the composition of the substrate as is a grab sampler;
- 4) The size and depth of the sample is large compared to that usually taken by grab samples;
- 5) It can be effectively operated from a small boat.

The use of the hydraulic dredge resulted in the description of a unique infaunal sand-bottom community which has not, to our knowledge, been described along the northern New England Coast. It is characterized by the burrowing anemone, Edwardsia sipunculoides, the bivalves, Siliqua costata, Artica islandica and Ensis directus, the polychaete, Clymenella torquata and the amphipods, Tmetonyx nobilis and Unciola irrorata. It is suggested that this assemblage has some similarities to the Venus gallina community described in Danish waters by Peterson.

The epifaunal component of the sand-bottom community and the hard substrate community are fairly similar to those that others have described along the Northern New England Coast.

The community structure of both hard and soft-substrate habitats are briefly discussed.

Submitted by: Weldon S. Bosworth, Jr. and Judy Dudley, Normandeau Associates, Inc.

Sincerely yours,

WSB:jic

Weldon S. Bosworth, Jr.

The Ecology of the Sand-Burrowing Amphipod  
Psammonyx nobilis (Amphipoda: Lysianassidae)

K. John Scott  
Jackson Estuarine Laboratory  
University of New Hampshire

The amphipod, Psammonyx nobilis, is found in intertidal and shallow subtidal sands, from Long Island Sound to Newfoundland. This species generally inhabits coastal areas but occurs at the mouths of estuaries and does penetrate into the middle St. Lawrence estuary, where salinities stay at about 20 o/oo. Intertidal and sub-tidal collections have been made at three locations in southern Maine and New Hampshire for over a year. A survey of approximately 30 beaches in New Brunswick and Nova Scotia, in May 1972, serves as a comparison to data collected in the Gulf of Maine.

The life cycle of Psammonyx is biennial, with breeding taking place from January to May and recruitment from June to August. The sex ratio varies throughout the year, probably as a result of migration and/or differential mortality. The distribution of Psammonyx is highly aggregated and could be related to its omnivorous and scavenging feeding behavior. Psammonyx prefers semi-exposed, fine-sand beaches, where detritus and organic matter accumulate providing an abundant food source. The affect of cestode parasitism on the life cycle at one location is considered important since it renders female Psammonyx non-reproducing. Future experiments will aim at explaining the observed field distributions in terms of some physical and biological factors.

Title: The impact of an atomic power plant on thermal conditions in the tidal flats of a Maine estuary.

Speaker: Michael Mazurkiewicz, Department of Biology (Portland-Gorham), and Department of Oceanography (Ira C. Darling Center, Orono) University of Maine

Abstract:

Diurnal and seasonal temperatures are being monitored almost continuously in muddy tidal flat sediments in the vicinity of the Maine Yankee thermonuclear power plant on the Sheepscot estuary.

The sediments are insulated against the temporal fluctuations in air-water temperatures which occur just above the tidal flat surface. Nevertheless, those sediments most directly influenced by heated discharges from the power plant, are not only elevated in temperature, but also undergo the most extreme diurnal and seasonal fluctuations in temperature. Furthermore, these thermal fluctuations are highly erratic since they vary in response to aperiodic changes in thermal output from the power plant.

The results of this study are being used in interpreting the effect of heated discharges upon benthic animals, especially the commercially valuable baitworms.

Projection needs: 35 mm slide projector and lantern-slide projector.

Food chain dynamics of the winter flounder Pseudopleuronectes americanus fed the polychaete, Capitella capitata.

Edward J. Chesney, Jr.  
Department of Biology  
Woods Hole Oceanographic Institution  
Woods Hole, Massachusetts 02543

Growth studies were conducted on juvenile (age class 0) winter flounder Pseudopleuronectes americanus in an experimental system with temperature-regulated flowing sea water. The fish were fed on the polychaete, Capitella capitata at a rate of 10% of their wet body weight per day. The experiment was carried out for 20 days. Wet and dry weights and organic carbon contents were determined for the polychaete and fish tissues and fish faeces and these data used to calculate various efficiencies. The gross growth efficiency (net production/food ingested) based on carbon data was 13% and the assimilation efficiency (food assimilated/food ingested) was 94%.

NAME: Charles K. Biernbaum, University of Connecticut

TITLE: Benthic Amphipoda of Fishers Island Sound, Connecticut.  
Seasonal Changes in Sedimentary Factor Control of Species,  
Feeding Type, and Living Habit Type Distribution.

ABSTRACT:

Final conclusions of this in-progress study have not yet been made. 14 stations were occupied in Fishers Island Sound in June, 1972, 23 in August, 1972, and 22 in January-February, 1973, in bottoms ranging from silt to gravel. Various measurements of sedimentary textural factors, Zostera occurrence, and shell content were made for each sample. The 61 species collected were categorized into feeding types and living habit types. Preliminary analyses suggest that summer species distributions are primarily reflections of feeding type distributions, whereas winter distributions reflect living habit type distributions. The importance of various sedimentary factors vary with respect to ecological grouping and season. Cluster analyses indicate seasonal changes in species assemblage composition, distribution, and distinctness. Sample groupings based on ecological types differ from those based on species, the significance of the difference varying according to season and ecological type.

PROJECTION REQUIREMENTS: Slide projector for 35mm slides.

Title: An Aquacultural Evaluation of Maine Yankee Atomic Power Station,  
Wiscasset, Maine.

ABSTRACT:

The thermal effluent of the Maine Yankee Atomic power plant, Wiscasset, Maine, has been evaluated for its potential use in commercial oyster, Crassostrea virginica, aquaculture. Trayed oysters have been placed at several Montsweag Bay sites in 1973 and a control site in the Damariscotta River.

Results indicate temperature at various sites have ranged from highs of 28.46°C (12.94°C above controls) to lows of 3.15°C (1.11°C below controls). Chlorophylls have had a range from 118.92 mg/m<sup>3</sup> to 7.30 mg/m<sup>3</sup> and particulate oxidizable carbons have ranged from a high of 961 ug/l to a low of 186 ug/l at the various stations. These levels appear to be effected by plant operation during the summer with fluctuations being at their height when the plant is shut down, and lower following start up during the same months.

Oyster response over this range of environmental parameters has been diverse but uniformly favorable when compared to controls. All stations reveal shell growth greater than controls. Warmer Montsweag Bay sites exhibit shell growth almost four times that of controls (24.51 mm vs. 6.56 mm), and cooler sites in the bay had shell growth more than twice that found in controls (17.60 mm vs. 6.56 mm). Total per cent solids have varied from 10.00% to 23.55% and glycogens have covered a range from 0.00% dry weight to 62.63% dry weight in oysters from Montsweag Bay. The condition of meats at warm water sites has at times been comparable to controls but generally falls below them. The cooler sites in Montsweag Bay have frequently exceeded controls in condition.

Accumulation of  $\text{Co}^{58}$ ,  $\text{Co}^{60}$  and possibly  $\text{Mn}^{54}$  have been observed in oysters at the plant while controls have remained normal in isotopic content.  $\text{Co}^{58}$ ,  $\text{Co}^{60}$ ,  $\text{Mn}^{54}$  and  $\text{Zr-Nb}^{95}$  have been measured in the sediments at the Montsweag Bay sites.

This study is an ongoing effort and results are presented as available to date.

Note:

Drs. C. Thomas Hess and Charles W. Smith, Department of Physics, University of Maine, Orono, are submitting a paper which deals in greater detail with the radioisotopes monitored during this study. If it would be possible it would be helpful to have their paper follow immediately after the above presentation.

Projection Requirements: 35 mm slide projector and screen.

[A. H. Price, III, Ira C. Darling Center for Research, Teaching and Service, University of Maine, Walpole, Maine]

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UNIVERSITY OF RHODE ISLAND  
KINGSTON, R. I. 02881

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College of Arts and Sciences • Department of Botany

Abstract for NEERS 1974 Spring Meeting

Marilyn M. Harlin

Department of Botany

University of Rhode Island

Kingston, R. I. 02881

Mobile discs: a technique to study colonization by macroalgae

Plexiglass discs 15 cm in diameter were divided into four quadrants. To the surface of three of these quadrants were cemented hard particles of uniform chemical composition. The discs were attached to rocks in the intertidal by expansion bolts, which while securing the substrata against water movement also permitted easy removal and replacement throughout the year of observation.

The greatest number of macroalgal species settled on surfaces with the largest particle size (1-2 mm). Whereas differences in the distribution of algae on these plates are not definitive, some patterns are appearing. Once these mobile substrata have been "seeded" with germlings in either the field or laboratory, they can be moved to selected sites in the estuary to monitor the condition of the water.

# WOODS HOLE OCEANOGRAPHIC INSTITUTION

WOODS HOLE, MASSACHUSETTS 02543

February 27, 1974

Phone (617) 548-1400  
TWX 710-346-6601

Dr. M. B. Abbott  
Marine Biological Laboratory  
Woods Hole, Mass. 02543  
Dear Dr. Abbott:

I would like to present a paper, co-authored with Mr. William Head, at the NEERS meeting in May. The title of the paper is "Nitrogen fixation associated with the marine macroalga, Codium fragile". An abstract is as follows:

## Abstract

Nitrogen fixation at rates up to  $7.3 \mu\text{g N}_2 \text{ fixed g dry wt}^{-1}\text{hr}^{-1}$  is associated with the marine macroalga Codium fragile. An Azotobacter-like bacterium has been isolated from the Codium and the bacterium is capable of fixing atmospheric nitrogen in pure culture under aerobic conditions. Scanning electron micrographs showed dense populations of rod-shaped bacteria, presumed to be the Azotobacter, on the Codium.

If Codium photosynthesis is decreased by light shading,  $\text{N}_2$  fixation drops proportionally, thus suggesting that  $\text{N}_2$  fixation is coupled to the release of dissolved compounds by Codium. Addition of glucose to sea-water increases  $\text{N}_2$  fixation indicating that the agent of  $\text{N}_2$  fixation is a heterotroph.

In a field survey, an inverse relationship was noted between  $\text{N}_2$  fixation and the concentration of combined-N compounds in seawater. At total-combined-N concentrations of about  $8 \mu\text{g at liter}^{-1}$ , no  $\text{N}_2$  fixation was associated with Codium. At Nobska Beach the total N-input through  $\text{N}_2$  fixation in the summer was  $2.4 \text{ mg m}^{-2}\text{day}^{-1}$  at depths between 1 and 3 m, and it averaged  $0.47 \text{ mg m}^{-2}\text{day}^{-1}$  in the 3 to 5 m stratum. Bacteria on the Codium may provide the alga with essential combined-N, a limiting nutrient in coastal waters. We believe that  $\text{N}_2$  fixation is one factor aiding the spread of this recently-introduced species on the Atlantic coast.

If possible, I would prefer to give the paper on Friday. Thank you.

Sincerely,

Edward J. Carpenter

EJC/eml  
Encl.

Stanley A. Riggs Jr.  
Botany Department  
University of New Hampshire  
Durham, N. H. 03824

Abstract for:

The 1972 Paralytic Shellfish Poisoning in New England:

Experimental Work and a Theory.

Paralytic shellfish poisoning (PSP) in humans has been recorded in various parts of the world for about three centuries (Prakash 1971). Halstead (1965) lists over 900 cases of P.S.P. with over 200 recorded human fatalities from various parts of the world between 1689 and 1962. Worldwide incidence of P.S.P. is now more than 1600 cases. Most cases have occurred in the subtropical and temperate zones (between 30 and 60<sup>0</sup> N latitude), with the Pacific coast of North America being the most seriously affected (Prakash, 1971). The Atlantic coast of North America is fourth in importance among areas of the world where P.S.P. is a public health hazard.

A strong association between the paralytic shellfish poisoning and preceding periods of heavy rainfall and river drainage has been established (Martin, 1967). This paper is an attempt to monitor the rate of initial growth of Gonyaulax tamarensis as affected singularly by several components of heavy rain and "run-off."

Initial growth phases of Gonyaulax tamarensis were monitored under conditions of varied concentrations of nitrate, phosphate, vitamins, trace metals, soil extract and a chelator. An optimal salinity was also obtained. Considering the factors involved in the occurrence of heavy rainfall and the run-off in lieu of the results of these experiments, it can be demonstrated that iron is an important, if not the most important, factor in the occurrence of the Gonyaulax tamarensis paralytic shellfish poisoning which occurred on the coast of New England during the summer of 1972.

This research was conducted under a Woods Hole Oceanographic Institution Summer Fellowship. I would like to extend my thanks to the Summer Fellowship Committee at the W.H.O.I. for its financial support and to my sponsor, Dr. Robert Guillard, W.H.O.I., for making this project possible.

Martin, D. F. 1967. in Advances in Chemistry Series, Robert F. Gould, ed., Amer. Chem. Soc. p. 263

Prakash, A., J. C. Medcof, and A. D. Tennant 1971. Paralytic shellfish poisoning in eastern Canada. J. Fish. Res. Bd. Canada Bull. p. 177

Larval Development of the Giant Scallop, Placopecten magellanicus (Gmelin)

Sexually mature P. magellanicus, collected by SCUBA diving, spawned in the laboratory at 10<sup>0</sup>-15°C. Larvae developed to the swimming gastrula at 12°C in 30-40 hours. In a thermal gradient of 12°-18°C, larvae reached the straight hinge stage in four days. Two populations of veligers were reared, one at 15°C and one at 19°C. The 15° population reached the pediveliger stage in 28 days, and the first spat was observed on the 35th day. At 19°C a mass mortality occurred when the larvae were approximately half-grown.

Eggs averaged 64 microns in diameter. The swimming gastrulae measured 69 microns long by 63 microns in diameter. Earliest straight-hinge veligers averaged 105 x 82 microns with a hinge line of 81 microns. The umbo stage began when larvae were 175 x 155 microns. Pediveligers were 279 x 242 microns with a depth of 127 microns and were inequivalved; the left valve was larger.

Larvae remained viable at salinities as low as 10.5 o/oo, and exhibited normal swimming from 16.9 o/oo to 30.0 o/oo in a 42-hour test.

Pediveligers showed a strong settling response to shell fragments of adult scallops and small pebbles. A tendency for larvae to settle on the undersides of these objects was noted. P. magellanicus may delay metamorphosis until suitable physical substrates for settlement are encountered. The settling response appears to be generalized and thigmotactic.

# Seasonal Hematological Variation of Winter Flounder

## Pseudopleuronectes americanus

David W. Bridges  
Joseph J. Cech, Jr.  
Drusilla R. Pedro

### ABSTRACT

Several hematological characteristics of winter flounder from Casco Bay, Maine, were studied for 13 months. Specimens were taken by otter trawl and held in 2000 l. circulating seawater tanks 14-50 days prior to study. The fish were fed a gelatin bound trout meal diet in the laboratory. After the fish had recovered from capture (as indicated by their feeding response), a sample of blood was drawn from 5-6 fish anesthetized with Ms 222 (1:14,000) each week. The following data were collected routinely: hematocrit, hemoglobin, blood oxygen capacity, red blood cell counts, white blood cell counts, thrombocyte counts, differential blood cell counts, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, plasma proteins, clotting time, K factor, and relative health. Those properties concerned with oxygen transport by the blood fluctuated from peak high levels in the autumn to peak low levels in the late winter and early spring. Conversely, those elements of the blood responsive to stress and disease reached peak high levels in the spring (following spawning and fasting periods) and peak low levels in the autumn. Erythropoietic activity was stimulated in the spring. The seasonal variations revealed may well be interrelated with cyclic phenomena such as spawning activity and fasting which generally corresponds with spawning for the population(s) studied.

Detmar Schnitker  
Department of Oceanography  
University of Maine  
Orono, Maine 04573

Ecotypic variation in Ammonia beccarii  
(Linne), an estuarine foraminifer

Laboratory experiments with specimens of Ammonia spp. indicated that Ammonia beccarii (Linne) is the only species of this genus that is present on the North American east coast from Maine to North Carolina. Acclimated local populations of this species exist which display wide morphological variation. Ammonia parkinsonia (Orbigny), A. advena (Cushman), A. tepida (Cushman), A. sobrina (Shupack), A. pauciloculata (Phleger and Parker), and A. limnetes (Todd and Bronnimann) are considered to be ecophenotypes and thus junior synonyms of A. beccarii.

Adult and near-adult specimens do not acclimate, however, temperature requirements change over successive generations. Physiological acclimation takes place during and possibly shortly after reproduction.

The Reproductive Biology of Genus Halisarca Dujardin  
(Porifera) in Nahant

Abstract

Annual changes in the structure and reproductive biology of two aspiculiferous species of genus Halisarca have been investigated over a two year period (1972-1973) at Nahant, Massachusetts. The seasonality of various reproductive events is reported for these two sponges. A comparison of histological and cytological characteristics of the two species, along with their reproductive patterns, has confirmed that histological data may be employed for determining genus, while the specific determination must be based upon embryological characters. The subtidal Halisarca is dioecious, while the intertidal form is monoecious: the former has a synchronous pattern of spermatogenesis (from November to March), and disc-like spermatozoa. The intertidal Halisarca has a successive pattern of spermatogenesis (from April to early May), and lemon-shaped spermatozoa. The larvae of the two species have an invaginated larval cavity and both metamorphose through a "diamorph" stage which is described for the first time in sponge embryology.

WEN TIEN CHEN

[Wen Tien Chen, Dept. of Biology, Northeastern University, Boston, Mass.]

Osmoregulatory ability of the rock crab,  
Cancer irroratus, under osmotic stress.

Angela C. Cantelmo, Frank R. Cantelmo, and Deborah M. Langsam

Despite its importance as a potential food source and its abundance in certain ecosystems, there is little published information on the physiological ecology of Cancer irroratus. Recent work in Sandy Hook Bay and Raritan Bay in New Jersey indicates that C. irroratus is not found in the estuary below 60% seawater. Therefore, the present study was undertaken to determine whether C. irroratus can osmoregulate.

Measurements were made of heart rate, hemolymph sodium content and osmolality at various salinities. The measurements of heart rate in reduced salinities suggest that they are not a reliable indicator of the physiological state of these crabs under osmotic stress. Crabs transferred directly from 100% (35 ppt) to 75% seawater maintained hemolymph isosmotic to the medium. The death of crabs transferred directly to 60% or 50% seawater may reflect the inability of osmoregulatory mechanisms to compensate over a short period of time to sudden osmotic stress. Crabs transferred to 50% seawater after acclimation to 75% seawater maintained hemolymph sodium and osmolality hyperosmotic to the medium.

The results suggest that Cancer irroratus is an osmoconformer in 75% seawater and above and a hyperosmotic regulator below 75% seawater.

New England Estuarine Research Society

May 2-4

Abstract: "Tolerance to salinity stress and osmotic regulation of three species of mud crabs"

by George M. Ruddy, Marine Research Laboratory, University of Connecticut, Noank, CT, 06340

The ability of three species of mud crabs (Xanthidae) to withstand salinity stress and to osmoregulate was studied. The three species are distributed in nature along a salinity gradient. Neopanope texana sayi occurs in the greatest numbers where the salinity is greater than 20 ppt. Rhithropanopeus harrisi is found predominately in water below 10 ppt. The distribution of Eurypanopeus depressus is between that of the other two species and overlaps them to some extent.

It was found that Eurypanopeus and Rhithropanopeus were both quite euryhaline, but that Neopanope was markedly less so. Eurypanopeus and Rhithropanopeus were able to hyperregulate the osmotic pressure and chloride concentration of their blood. Neopanope was a much less efficient regulator. All three species were osmoconformers at salinities above about 25 ppt. The ability of Eurypanopeus and Rhithropanopeus to osmoregulate may be aided by the fact that they are much less permeable to water and therefore presumably also to salts. In addition, Eurypanopeus and Rhithropanopeus were found to be able to reduce their permeability at low salinities.

In an attempt to determine the energetic cost of osmoregulating, it was found that all three species had greater oxygen consumption at low salinities. However, it may be that this result, which has been reported by numerous other investigators working on a wide variety of animals, is an artifact arising because more oxygen is available in less saline water. When the oxygen consumption of crabs exposed to different salinities was measured in air, the effect of salinity was negligible.

I could prefer to be scheduled Friday or early Saturday as it may be necessary to leave before the meeting ends to make the ferry back home.

INEXPENSIVE MODULAR HABITATS FOR JUVENILE LOBSTERS,

Homarus americanus

by

Matoira H. Chanley  
Shelter Island Oyster Co., Greenport, NY and  
Suffolk County Community College, Selden, NY

and

Orville N. Terry  
Marine Sciences Research Center  
State University of New York, Stony Brook, NY

ABSTRACT

With increased recent interest in laboratory rearing of lobster juveniles either in conjunction with mariculture or for bioassay or Physiological studies the need for inexpensive housing has become apparent. This paper describes modular habitats suitable for 3 - 8 lobsterlings (depending on size) from fourth stage to about 15 months, at a cost of about 11-26¢ per lobster (at current prices).

These habitats would also be suitable for a variety of other organisms maintained either in flow-through or recirculated systems where it is necessary to keep the individuals physically isolated.

The Effect of Experimental Sewage Sludge Additions upon Populations  
of the Fiddler Crab, Uca pugnax (Smith).

The effect of sewage sludge addition upon the fiddler crab, Uca pugnax, was investigated in a Massachusetts salt marsh. From June to November weekly doses of a sewage sludge fertilizer were added to replicate 20 m. diameter plots to simulate sewage sludge contamination. In November a loss of locomotor control and high mortality was noted in crabs from the treated plots. A behavioral bioassay of the chemically fractionated sludge fertilizer showed that the toxicity was contained in the extractable organic fraction. Gas chromatographic analysis of this fraction showed high quantities (1.4 - 116.0 ppm) of aldrin and smaller quantities (0.01 - 2.1 ppm) of dieldrin. Analysis of the surface sediments from the treated plots showed the presence of aldrin and dieldrin. Paradoxically, analysis of dead crabs collected from the treated plots revealed extremely low levels of aldrin (4 - 8 ppb) and high levels of dieldrin (420 - 430 ppb). In crabs collected alive from the treated plots, the levels of dieldrin were dose dependent, while the levels of aldrin were not. Thus, there is strong inference that the crabs are capable of in vivo metabolism of aldrin to dieldrin.

Charles T. Krebs  
Boston University Marine Program  
Marine Biological Laboratory  
Woods Hole, Ma. 02543

Night sampling of estuarine macrozooplankton  
with buoyed and anchored nets

B. J. McAlice and G. B. Jaeger  
Ira C. Darling Center, University of Maine

Abstract

Buoyed and anchored nets are fished at four depths over a full tidal cycle during darkness; cod ends are changed at slack water. In Montsweag Bay, Neomysis americana is the dominant organism (> 80% of the population). The only other numerically important species is Oxyurostylis smithi (8%). In the Sheepscot River estuary, Diastylis sculpta (> 60%) is most abundant, followed by Calanus finmarchicus (6%). Many nominally benthic organisms are regularly taken, including cumaceans, amphipods, and isopods: over 100 species have been identified. Vertical distribution is discussed.

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18 Mar 71  
ESM

Marine Biological Laboratory  
WOODS HOLE, MASSACHUSETTS 02543

Some Effects of Warm Saline Effluents

The cooling water system of the Jersey Central Power and Light Company plant on Barnegat Bay, New Jersey has markedly influenced Oyster Creek and Forked River. Both creeks were previously fresh water for much of their length. They are now both saline and Oyster Creek, the discharge canal for the plant, is also warm. These changes have resulted in the introduction of shipworms and the populations have built up rapidly. The worms are now devastating the piling in Oyster Creek and the larvae carried out of the creek are a source of infection for other areas of the bay. Additional problems resulting from the increased flow of warm saline water in Oyster Creek include fogging, mildew, dry rot, silting and fouling. Wherever such situations are created one can expect all of these problems to develop.

Ruth D. Turner  
MCZ  
Harvard Univ

**(STANDBY PAPERS)**

Title: Sorting bacterial neuston by light scattering characteristics.

Abstract: About 90% of the colonies of bacteria collected from the surfaces of estuarine and saline water show diffraction colors when viewed by transmitted light. Analysis by laser scattering and interpretation of the patterns with reference to the spacing and size of cells in colonies, and the application of this method to observation of bacterial community composition will be discussed for this research in progress.

Projection requirements: 2x2 (35 mm) slides.

[C. A. Laws, Harvard University, Cambridge, Mass.]

Transaminase activity in the heart of rock crab, Cancer irroratus,  
exposed to cadmium salts

by Edith Gould and Reis S. Collier

Heart muscle of the rock crab, Cancer irroratus, contains large amounts of the transaminase aspartate aminotransferase (AAT, E.C. 2.6.1.1). After crabs have been exposed to cadmium chloride, transaminase activity increases significantly, whereas after similar exposure to cadmium nitrate the activity is depressed. Moreover, residual transaminase activity after in vitro electrolyte stress was greater in the crabs exposed to cadmium chloride than in the controls, but lesser in the crabs exposed to cadmium nitrate. These observations point to the importance of the anion in metal-tolerance studies, and will be discussed from the standpoint of physiological stress.

Miss Gould will present the paper.

Title:      Reproduction of the polychaete Nereis diversicolor in thermally modified and unmodified habitats of a Maine estuary.

Speaker:    Peter Schroeder, Department of Oceanography (Ira C. Darling Center), University of Maine (Orono)

Abstract:

The sandworm Nereis diversicolor inhabits boreal-temperate estuaries and is amphi-Atlantic in distribution. Although the reproduction of this polychaete has been studied in Europe, no published account on this subject is available with reference to American populations.

A study was initiated in the summer of 1973 for the purpose of defining the seasonal reproduction of N. diversicolor in the Sheepscot estuary of Maine. One of the populations in this estuary occurs in Bailey Cove which receives heated discharges from a thermonuclear power plant and, therefore, the effect of thermal addition on N. diversicolor reproduction is also being examined.

Females bear immature oocytes throughout the year; but mature females (with oocytes at least 200  $\mu$  in diameter) and mature males are restricted in their occurrence from about June to early October. During the latter period in 1973, a major peak of reproductive activity occurred in September in Bailey Cove and in July in populations from thermally unmodified habitats; no other gross differences in reproduction were noted between the populations.

Comparing observations from this study with those of European workers, there is considerable geographic variation in seasonal times of reproduction, sizes of gametes and sex ratios of N. diversicolor.

Projection needs: 35 mm slide projector and lantern slide projector.

## ABSTRACT

### In Vitro Growth Characteristics of Cellulose Decomposing Salt Marsh Fungi

Approximately 25% of the dry weight of Spartina is cellulose (1). Since Spartina is the major producer on east coast marshes, this percentage represents a significant proportion of the carbon fixed in a salt marsh. There is evidence to indicate that microbial action is probably responsible to a great extent for the overall decomposition of Spartina (2). It has been reported that fungi are both present in the leaves of Spartina (3) and that they serve as a food source, if not on the marshy at least in other areas of east coast estuaries(4).

The present work concerns itself with the isolation of cellulose decomposing fungi and several parameters of their growth in a carboxymethylcellulose broth medium. The parameters measured with time in culture include biomass, reducing sugars and soluble protein. It is hoped that these in vitro studies provide some clue as to what specific microorganisms participate in the decomposition of Spartina on Northern New England salt marshes. This presentation will communicate the methods used and the parameters obtained for one of the isolated fungi.

1. Burkholder, P.R. 1956 Bull. Torrey Club 83:327-334
2. Burkholder, P.R. and Bornside, G. 1957 Bull. Torrey Club 84:366-383
3. Gessner, R.V. and Coos, R.D. 1973 Mycologia 65:1296-1299
4. Meyers, S.P. and Hopper, B. 1967 Helg. Wiss. Meer. 15:270-281

[Jerome J. Cura, Jr., Department of Biology, Northeastern University, Boston, Mass.]

Rec'd  
15 Mar 71  
JSC

TITLE: Salinity Versus Size Gradients for Several Species  
of Juvenile Fish in the Hudson River Estuary

ABSTRACT: The young-of-the-year for five species of estuarine fish, Alosa aestivalis, blueback herring, A. pseudoharengus, alewife, A. sapidissima, shad, Morone americana, white perch, and M. saxatilis, striped bass were collected by off-shore, beach seining at selected stations in the Hudson River estuary for the summer and fall of 1973. Preliminary results indicate that, in the three species of Alosa, a gradient of sizes is established parallel to the salinity gradient of the estuary during the summer so that the smallest fish inhabit the less saline, upper portions of the river and the larger fish the downstream areas. Other factors influencing the distribution of the juveniles - daylength, water temperature, bottom type, turbidity, food, and interspecific relationships - are considered.

(Master's Thesis - Research in Progress)

SUBMITTED

BY: Amelia J. Janisz, Graduate Student at  
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American Museum of Natural History, Ichthyology  
Department

Microestuarine Infaunal Distribution Patterns in the  
Vicinity of Intertidal Freshwater Springs

Present studies indicate that the interstitial salinity gradients found in the vicinity of intertidal freshwater springs on Cape Cod closely mimic those found in large scale estuarine systems. More importantly, these salinity gradients are reflected in the distribution patterns of the macro-invertebrate infauna inhabiting these areas. These patterns exhibit a strong correlation with the reported patterns of these species in estuaries, particularly for those species that are considered to be characteristic of the oligohaline reaches of estuaries. The present work is primarily concerned with the spatial and temporal distributional patterns of Almyracuma proximoculi. This typically oligohaline cumacean evidently has a seasonal migration into and out of the immediate area of the springs.

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*28 March 77*