NEW ENGLAND ESTUARINE RESEARCH SOCIETY

SPRING MEETING

May 3-5, 1973

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]

Spring NEERS Meeting at Woods Hole

May, 1973

Contributed paper:

"Recent Studies on the Hydrobiology of the Middle St. Lawrence Estuary in Eastern Canada"

ABSTRACT

Preliminary studies on the distribution and abundance of medium zooplankton in the Middle St. Lawrence estuary between Ile d'Orleans and the Saguenay fiord during 1971 revealed three principal populations:

(1) an essentially coastal marine group of species, further subdivisible into breeding and non-breeding populations, that penetrate landwards mainly in cold, high salinity bottom waters;

(2) an estuarine endemic holoplanktonic group, dominant and endemic in medium-brackish cool middle waters, mainly near the surface; and

(3) a fresh-water holoplanktonic group dominant in the warm tidal fresh waters of the estuary. The vertical swimming behaviour of the animals and the two-layered estuarine circulation apparently combine to concentrate the marine forms in discreet, deep channels near their upper limit of occurrence, in biomass sufficient to form a significant food source on which capelin and ultimately white whales depend.

Requires: 2 x 2 slide projector. 10-15-20 minutes.

SEASONAL PATTERNS OF ENCRUSTING MARINE INVERTEBRATES IN THE THAMES AND NIANTIC RIVER ESTUARIES (CONNECTICUT)

by

John C. Reed

U. S. Coast Guard Academy, New London, Connecticut

Abstract

A succession panel sampling of encrusting marine invertebrates of Connecticut's Thames (June 1971 - November 1972) and Niantic River Estuaries (June 1971 - June 1972) yielded seven major fouling species. The dominant species on the Thames River panels were the bryozoans Pedicellina cernua and Electra crustulenta and the barnacle Balanus eburneus. On the Niantic River panels the serpulid Spirorbis violaceus and the bryozoans Cryptosula pallasiana, Schizoporella unicornis and Bugula turrita dominated.

Distinct settlement patterns were observed by monthly monitoring of wooden succession panels. The patterns delineate annual settling cycles of seasonal succession among species and panel face dominance.

A comparison of settling patterns and Thames River fresh water inflow data indicates a sensitivity of settling organisms to major changes of estuarine salinity. In 1972, a high fresh water inflow period, the settling peaks were lower in magnitude and delayed two to four weeks over 1971, a low fresh water inflow period. The shift of panel face fouling dominance between the summers of 1971 and 1972, and the coincidence of a major sloughing of adult barnacles with a menhaden kill in the Thames in early September 1971, are two phenomena that remain unexplained.

ZOOPLANKTON DENSITIES AND LIGHT TRANSMISSION IN LONG ISLAND SOUND

Robert A. Radulski
Southern Connecticut State College
501 Crescent Street
New Haven, Conn. 06515

Four stations in Long Island Sound were each sampled for zooplankton at three depths from July to October 1972 with a half-meter, #10 (153 micron) plankton net. Transmissometer data were also obtained at these stations. Water samples were taken with Van Dorn bottles at each of the sampling stations and depths in order to determine phytoplankton concentrations.

Phytoplankton and other minute particulate matter reduce light transmission by approximately 50% per meter (air = 100% transmission). Further decreases in light transmission were caused primarily by zoo-plankton.

A correlation ($R = 0.85$, $R^2 = 0.72$) was found between % light trans-mission per meter and zooplankton captured (grams wet weight per tow).

Even though many opportunities for error may exist in this preliminary study, the results suggest that rapid quantitative estimates of vertical and horizontal plankton densities can be made from measurement of light trans-mission.

Projection requirements: 35mm slide projector

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TITLE

An ecological study of four species of *Polysiphonia* (red algae) in a New England Estuary

BY

Richard A. Fralick
Department of Botany and the Jackson Estuarine Laboratory
University of New Hampshire
Durham, New Hampshire 03824

ABSTRACT

A laboratory study of the photosynthesis and respiration of four species of *Polysiphonia* is compared with their distribution in an estuary, along well defined temperature and salinity gradients.

TITLE: An E.M. Study of Epithelial Inclusions in the Epidermis and Gut of Several Eolid Molluscs

BY: M. Patricia Morse

ADDRESS: Marine Science Institute, Northeastern University Nahant, Massachusetts, 01908

ABSTRACT:

Adult epithelial tissues of Coryphella stimpsoni and Aeolidia papillosa were surveyed by utilization of the Electron microscope for the occurrence and morphology of the characteristic epithelial vacuolar bodies. Juveniles of Coryphella stimpsoni both fed and those which have not been in contact with any food were also studied. Evidence of the sites of formation, mode of production and possible function for the epithelial inclusions is presented. A three dimensional model of the vacuolar body is suggested.

WOODS HOLE OCEANOGRAPHIC INSTITUTION
WOODS HOLE, MASSACHUSETTS 02543

Phone (617) 548-1400

R E C E I V E D
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MARINE RESEARCH
LABORATORY

February 22, 1973

Dr. M. B. Abbott, Acting Secretary
New England Estuarine Research Society
Marine Research Laboratory
University of Connecticut
Noank, Connecticut 06340

Dear Dr. Abbott:

I would like to give a paper at the May NEERS meeting in Woods Hole. The title is, "Passage of copepods through a nuclear power station on northeastern Long Island Sound." The abstract is as follows.

Approximately 70% of the copepods entering the cooling water system of a nuclear power station on northeastern Long Island Sound are lost in the effluent pond and not returned to the Sound. Passage through the plant causes the copepods to sink (ca. 3 times more rapid than controls) in the 30 m deep effluent pond. Thermal shock and chlorination are not major factors affecting copepod loss at this power plant. Probably the mechanical effects of passage through the plant induces the sinking response. No measurable change in copepod concentration was noted in waters near the power plant. The effects of the observed loss of copepods on the biology of local waters is discussed.

Sincerely,

Edward Carpenter

EJC/cl

Edward J. Carpenter

UNIVERSITY OF MAINE at Orono

Ira C. Darling Center for Research, Teaching and Service
(The Marine Laboratory)

Walpole, Maine 04573
207/563-3146

28 February 1973

Dr. M. B. Abbott
Acting Secretary, NEERS
Marine Research Laboratory of the University of Connecticut
Noank, Connecticut 06340

Dear Dr. Abbott:

I would like to have the following title and abstract considered for the spring, 1973 NEERS meeting. The presentation will require 35 mm projection equipment only.

THE SEPARATION OF ZOOPLANKTON
ENTRAINMENT MORTALITIES INTO
MECHANICAL DAMAGE, THERMAL STRESS AND
SYNERGISTICS EFFECTS

This is a work-in-progress report on a sampling program being carried out at the Maine Yankee Atomic Power Plant and the Mason Station Fossil Fuel Plant in Wiscasset, Maine. Mechanical damage to zooplankters is being evaluated by sampling water pumped through a plant's condensers with no AT. Thermal stress is being evaluated by laboratory simulation of the thermal regime of a plant's cooling waters in con-junction with samples taken during a plant's normal operation. The latter samples are used to evaluate the possible synergistic effect between mechanical damage and thermal stress. Preliminary results will be discussed.

Thank you.

Sincerely yours,

Robert W. Crippen
Research Associate

RWC/ph

Encl.

Intraspecific Variation in an Aplacophoran Mollusk from the North Boreal and Arctic Continental Shelves

Amelie H. Scheltema

Woods Hole Oceanographic Institution

Chaetoderma nitidulum is a common and widespread species of Aplacophora found on northern continental shelves. Recent new collections affording freshly preserved material and older existing museum collections have been used to arrive at some understanding of intraspecific variability in this little known molluscan group.

Samples were examined from populations located south of Woods Hole, in Massachusetts Bay (including Cape Cod Bay), in St. Margaret's Bay (Nova Scotia), in Disko Bay off West Greenland, off Southwest Greenland, around Iceland, and in the North Sea. The characters found to be most useful taxonomically were radula length, and spicule morphology as revealed by the scanning electron microscope.

The results show (1) a clinal change in spicule morphology, (2) a constancy both in radula morphology and in allometric change of body proportions, and (3) a statistically significant difference in ratios of radula length/body length. Chaetoderm nitidulum is thus shown to be a species with wide intraspecific variability in some characters, especially radula size. It is suspected to be a circumarctic in distribution and will eventually include the synonymy of several Pacific species.

Fungi from Spartina alterniflora in Rhode Island

Robert V. Gessner, Dept. of Botany, University of Rhode Island, Kingston

SUMMARY

A survey was made of the fungi associated with Spartina alterniflora in southern Rhode Island. Eighteen ascomycetes, twelve deuteromycetes, and two basidiomycetes were collected, some of which are new records for S. alterniflora and New England. "Marine" and "terrestrial" species occurred in approximately equal numbers. Alternaria spp., Leptosphaeria discors, L. typharum, Phoma sp., Septoria sp., and Sphaerulina pedicellata were the most common species, being present in 41—86% of the collections. Living plants supported a substantial fungal growth, particularly Sphaerulina pedicellata. Dead culms were invaded by saprobic ascomycetes and occasionally lignicolous species. Estuarine salinity did not appear to affect the occurrence of the predomant fungi.

Nitrogen Fixation by Salt Marsh Blue-Green Algae

Charlene Van Raalte

Blue-green algal nitrogen fixation was measured *in situ* in Great Sippewissett Marsh, Falmouth Massachusetts by the acetylene reduction technique. The effect of sewage sludge addition on algal nitrogen fixation in treated and untreated areas of the marsh was also determined. In addition, N_2 fixation was measured within a large algal mat located seaward to the marsh. There is a marked inhibition of nitrogen fixation as the ammonium concentration in treated plots increases. Sludge fertilization at a high level (25 $g/m^2/wk$) inhibits N_2 fixation to a significant degree ($p=0.01$) while fertilization at a low level (8.5 $g/m^2/wk$) does not. Nitrogen fixation rates during the summer of 1972 in the marsh range from 2.5-325 $ngN/cm^2/hr$ and in the mat from 50-250 $ngN/cm^2/hr$. *Calothrix* sp. is the only heterocystous blue-green algae present. *Calothrix* seems to be partially responsible for nitrogen fixation although the correlation coefficient obtained from marsh measurements suggests that other potential nitrogen fixers, such as red photosynthetic bacteria, may be active in the marsh ecosystem.

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Dredge Spoil Disposal in Rhode Island Sound
Effects On Benthic Animals

Sheldon D. Pratt, Research Associate
Graduate School of Oceanography
University of Rhode Island
Kingston, R. I. 02881

ABSTRACT

Over a five year period a variety of studies have been carried out on aspects of dredge spoil disposal at a site off Newport, Rhode Island. These included two quantitative benthic studies. Major use of this site ended after the completion of dredging of the Providence River in late 1970. Recovery of the benthos has been poor in terms of biomass, although large numbers of species are often found. The spoil sediments are patchy and evidence of substrate specificity was found among colonizers.

Projection requirements: 35mm Only

NEERS - Spring Meeting 1973

Title: Gas production in solid waste in the marine environment

Abstract:

This study is part of an investigation dealing with the environmental impact of offshore dumping of municipal solid wastes. Experimental solid waste beds in troughs of seawater were monitored for gas content over a period of more than half a year. Initial gas production evolved large amounts of H_2 (about 1100 ml Kg^{-1} day^{-1} at 25°C), but this ceased within a month. Later H_2S and CH_4 were produced at rates of about 3 and 0.3 ml Kg^{-1} Day^{-1}, respectively, at 25°C.

-A.G. Gaines Jr.
Narragansett Marine Lab
University of R.I.
Kingston, R.I. 02881

ABSTRACT

Among numerous coliphage species isolated from a sewage polluted estuary was found an isolate which exclusively attacked Escherichia coli ATCC 9637. Growth studies revealed an absolute requirement for the presence of copper ions and optimum development of progeny phage in seawater medium. The coliphage, found to contain a core of RNA, demonstrated no specificity for male (F^+) strains of bacteria, and was insensitive to the action of ribonuclease.

Due to structural similarities to members of the human enterovirus group, the coliphage, designated coliphage 9637, has been considered as a possible index for enteroviral pollution of estuarine systems.

[Isolation of a copper-dependent coliphage from a sewage polluted estuary. – James M. Vaughn, WHOI]

Investigators: Kenneth W. Turgeon and Richard Franck

TITLE: Size and sex ratio differences in oyster drills from Great Bay, New Hampshire

ABSTRACT

Three hundred and ninety-seven oyster drills, hand collected from Great Bay, New Hampshire, were sexed and measured. Results of t tests showed that females had a significantly greater mean shell length than males. Chi-square analysis showed that this difference in mean shell lengths between the sexes is due to a significantly greater number of females than males in the larger size classes.

Projection Requirements: 2” by 2" slide projector and screen

$\$100 - \$125$

Title:

Some effects of low temperature upon the mantis shrimp, Squilla empusa Say in Buzzard's Bay.[1]

Abstract:

Laboratory tests have suggested that decreasing water temperatures effect the behavior of Squilla empusa and this may explain the apparent increased abundance of these shrimp in local estuaries during the late fall.

Dr. Frank O'Brien
Biology Department
Southeastern Massachusetts University

TITLE: Submerged Plastic Net Structures for Oyster Propagation

by

Keh Tung[a] and John W. Zahradnik[b]

ABSTRACT

The work presented in this report is an experimental investigation of the performance of submerged plastic net structures (S.P.N.S.) for oysters. The experimental model is described. There are three variables involved in this study, net mesh size, population density and oyster initial length Floatation was added to the structure so the unit floated off the bottom and below the surface to avoid both bottom predation and surface freezing. Data gathered from the experimental models were used to make cost/benefit comparisons.

Graphs are presented which show various relations between growth rate, mesh size, population density, initial size, final size and total growth. It is concluded that on the basis of observed performance and cost-benefit relations, the S.P.N.S. system appears to be an attractive possibility for a future low investment shellfish aquafarm. However, other biological aspects of the concept require investigation before the feasibility of this system is firmly established.

[a]Research Assistant

[b]Principal Scientist, UMass Aquacultural Engineering Laboratory at Wareham.

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MAR 13 1973

MARINE RESEARCH LABORATORY

THE UTILIZATION OF ARTIFICIAL HABITATS ON SAND SUBSTRAIT BY THE AMERICAN LOBSTER (HOMARUS AMERICANUS)

John M. Flowers and Daniel J. Sheehy
Marine Experiment Station
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Kingston, Rhode Island 02881

Abstract

Based on observations made of the burrowing habits of the lobster a simple artificial habitat was developed. It was designed for use on sand or gravel bottom normally not suitable to the lobster for habitation. The habitat was tested for its ability to attract lobsters, selectivity for a particular size class of lobster, acceptable nearest neighbor distances, and orientation of the habitat in relation to bottom currents necessary for maintaining a stable position on the bottom.

It was clearly demonstrated that: (a) the habitat did attract lobsters; (b) nearest neighbor distances were critical in habitat selection for the larger lobsters; (c) orientation of the habitats should be with the open ends perpendicular to the bottom current. A total of 194 lobsters were counted in an area containing 196 habitats. The lobsters counted ranged from 1.38 to 9.25 inches in total body length. Numerous cases of multiple occupancy of a single habitat were observed.

Further observations noted the need for a slightly larger single unit habitat which would encompass all size classes of inshore lobsters.

Development and developmental adaptations of the brittlestar, Amphioplus abditus (Verrill). Gordon Hendler, The University of Connecticut, Storrs.

Amphioplus abditus, a shallow-water Northwest Atlantic amphiurid, bypasses planktonic development, metamorphosing on the surface of the sediment within a large, adhesive fertilization membrane. Early development involves an exaggerated process of formation of the fertilization membrane. Within 24 hours after fertilization closing of the blastopore and appearance of the larval skeleton and hydrocoel mark the completion of gastrulation. The triangular-shaped embryo generates an ophiuroid rudiment within 48 hours and by 72 hours the ophiuroid moves freely within the fertilization membrane having resorbed the larval body and larval skeleton. The active juvenile with a functional gut hatches within 100 hours.

Rapid demersal development of this type incorporates certain advantages of both viviparous and planktotrophic strategies. The embryos are assured an adequate supply of stored nutrient and the large, sticky fertilization membrane not only keeps them near the favorable milieu of the parent population (with limited capacity for dispersal) but acts as a shield against microorganisms and meiofaunal predators. The rapidity of development may also serve to minimize mortality. The low numbers of eggs produced by abbreviated developers such as A. abditus compared with egg numbers of ophiuroids with indirect development, as well as the lesser volume of eggs produced per season, indicate that rapid demersal development is energetically economical for reproducing individuals as well as advantageous for the embryos.

Salinity tolerance of A. abditus embryos and juveniles was tested to determine whether demersal development could protect them from the potentially lethal low salinities which occur in the surface water of the lower estuaries where the species is found. It was concluded that demersal development could be an advantage to the species, as a salinity of at least 25 ppt was necessary for normal development.

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ABSTRACT

The Toxicity of Mirex to the Estuarine
Grass Shrimp, Palemonetes pugio,

The effects of Mirex, a chlorinated hydrocarbon insecticide used to kill the imported fire ant, on juvenile (10-20 mm) and adult (20-35 mm) Palaemonetes pugio are described. Static system bioassays were carried out using technical concentrations and 0.15% Mirex bait granules. Mortality data was taken after 48, 96, and 144 hr. exposure periods to 0.01, 0.1, and 1.0 ppm concentrations. Mortality began between 24 and 72 hrs. after initiation of exposures to 1.0 and 0.01 ppm respectively, with 0.1 ppm being inter-mediate in time until beginning of mortality. Exposure for 48 hours to 0.01 ppm inflicted 400 mortality over a 12 day period. Mortalities of 100% occurred in 6 days following a 96 hour exposure to 0.1 ppm, and total death prevailed during a 96 hour exposure to 1.0 ppm. Exposure to 2 bait granules caused 50% mortality in 8 days to adult shrimp, and 80% mortality to juveniles. Amount and rate of mortality was directly proportionate to concentration and duration of Mirex exposure, Mcrtality also appeared to be correlated

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inversely with animal size, and was continuous during the test periods, often with an initial delay. This corresponds to other Mirex bioassays on crustaceans.

The abundance of grass shrimp in Gulf and Atlantic coastal shallows indicates their ecological significance. Thus Mirex-induced mortality in estuarine Palaemonetes could prove disruptive to the estuarine ecosystem.

(Accepted for publication in Gulf Research Reports, Jan. 1973)

28 March 1973

A seasonal survey of the fishes in the Mystic River, a polluted estuary in downtown Boston

Richard_L, Haedrich, WHOI
Susan O. Haedrich

Approximately 20 species of fishes have been recorded in the Mystic River during surveys conducted with trawls and gillnets four times a year. Winter flounder are the overwhelmingly dominant species. Alewives and smelt can be abundant on a seasonal basis. The changing patterns of standing crop (biomass), diversity, species composition, and distribution within the estuary are presented.

Abstract - The lower Mystic River, an extension of the municipal deep-water port facilities of Boston Harbor, can be considered a highly polluted and stressed environment. It is characterized by anoxic sediment with high organic content, low oxygen concentrations in the bottom water, low diversity of the benthic macrofauna, and an abundance of species commonly considered pollution indicators. The exception to this generalization was a single station adjacent to the thermal effluent of a Boston Edison Company oil-fired electric-power generating plant. The possible theoretical relationships between pollution stress and diversity relative to latitudinal selection processes are discussed with the presentation of benthic invertebrate data.

[Benthic community parameters in the lower Mystic River (Mass.)
G. T. Rowe, P. T. Polloni and J. I. Rowe, WHOI]