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ABSTRACTS

RELATIONSHIP BETWEEN LARVAL SETTING ORDER AND
SPAT GROWTH RATES IN THE OYSTER (CRASSOSTREA VIRGINICA)

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The relationship between larval setting order and subsequent spat growth in the American oyster was analyzed. Four separate full-sib families were examined. In all cases, spat that metamorphosed during the first 3 days of the setting period were significantly ($P < .05$) larger at 29 wk post-setting than spat that metamorphosed later during the setting period. Data from one family, measured at 12 wk and 29 wk post-setting, indicated that initially differences in size among the young spat became more pronounced as the oysters got older. Data collected at 18 months post-setting showed that significant differences in size between early and late setters was no longer evident. Further data collected at 24 months post-setting confirmed this point. These results indicate that selection for early juvenile growth could be accomplished by hatchery selection of larvae that set earliest. However, setting order has little or no effect of size of oyster at market age.

TYCHOPLANKTONING: A SUPPLEMENTAL METHOD TO BENTHIC SAMPLING.

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Organisms traveling above the water-benthos interface into the water column are frequently underemphasized in plankton investigations. Critical observations on plankton samples collected in a nearshore area of the Gulf of Maine and a mid-Atlantic estuary revealed a diverse and occasionally abundant assemblage of organisms. Amphipod, cumacean, polychaete, mysid, and harpacticoid copepod taxa contributed the greatest number of the approximately more than 100 species found in each area.

Although most species show but only a casual occurrence in the plankton, their presence is indicative of a benthic fauna richer than can be ascertained by small scale benthic sampling. Other species such as Neomysis americana, Leptocheirus plumulosus, Leucon americanus and Paranychocamptus huntsmani through their abundance depicted predictable seasonal and/or nocturnal periodicities as members of the plankton community. The accumulation of all the rare and abundant forms into a single group, the tychoplankton, illustrates a trophic resource whose potential importance is generally given to holoplankton and meroplankton.

TRANSPORT OF SUSPENDED PARTICULATE MATERIALS IN A NEW
ENGLAND SALT MARSH. Murray, R. E. and E. Ruber.
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Standing crop and transport of suspended particulate material was investigated within two drainage areas of a New England salt marsh. Standing crop was measured as material retained by a Whatman GF/C glass fiber filter. Concentrations of suspended particulate material in the marsh channels, ranged from 2 to 100 mg dry wt./l and 0.8 to 16 mg ash-free dry wt./l. A pronounced variation in the concentration of material over the tidal cycle was consistently observed in both areas, with highest levels occurring during the flood portion of the tidal cycle. Little variation in the concentration of material occurred with depth except for elevated levels in surface film and bottom samples. Slightly higher levels of materials were noted in winter and early spring, but overall the daily tidal cycle variation exceeded the magnitude of seasonal variation. A hydrological model was developed for each area from measurements of water velocity and creek cross-section. The hydrological data was integrated with the standing crop data for the flux calculation. Both drainage areas acted as sinks for particulate material with 12 of the 14 observed tidal cycles demonstrating a net import. Annual budgets for import of total, organic and inorganic suspended particulate material were 342.2, 39.0, 303.2 and 340.5, 45.4, 295.2 gm/M²/Yr respectively for the two areas.

Seasonal Variation in Bioturbation Activities
in a Northern Temperate Estuary as Determined by X-radiographic Techniques

by

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X-radiographs of hand-collected box cores were obtained within a 1 m² area at a subtidal location in the Great Bay estuary, New Hampshire. These photographs coupled with sediment and pore water data give an interesting perspective into the processes that can alter the physical and chemical properties of sediments. The macrobiology of each photograph was scrutinized to detect what organisms, if any, were altering the sediments. A seasonal pattern was observed which reflects the activity of various faunal groups. This was evidenced by the extensive variability in core structures and types of infauna and epifauna over time at this site. It appears that the majority of bioturbation activity takes place from mid to late summer (July-August) into the early winter (December) with little or no activity from January to June. Due to the shallow water depth at this site (1 m at mean low water) the species present throughout the year are primarily suspension feeders and site can be classified by a colonizing or non-equilibrium biological assemblage.

THE VERTICAL DISTRIBUTION OF METAL-TOLERANT BACTERIA IN NEARSHORE CARBONATE SEDIMENTS OF BURMUDA. Hines, Mark E. and Galen E. Jones. University of New Hampshire, Department Microbiology and Jackson Estuarine Laboratory, Durham, New Hampshire.

Aerobic and anaerobic-heterotrophic, sulfate-reducing, and aerobic metal-tolerant bacteria were enumerated in sediment cores during a benthic biogeochemistry study. Spread plate techniques were used throughout and anoxic conditions maintained during handling and incubation of anaerobes. The distribution of sulfate reducers and of other heterotrophs varied between sites and with depth. The vertical abundance of metal-tolerant bacteria, reported as a percentage of organisms recovered on metal-containing media compared to controls, varied as much as 50-fold within the top 12 cm of individual cores and inversely followed the distribution of sulfate reducers. In some instances metal-containing media stimulated bacterial growth as evidenced by counts six times higher than controls. These data suggest that the sediment micro-flora adapt dramatically to increases in metal availability with the precipitation of metal sulfides as an important mechanism for metal removal. Metal-tolerant organisms also appear to require an unknown growth factor released into the growth medium by the more reactive metal ion. Although this stimulation/inhibition phenomenon has repeatedly not been found in clastic sediments, it may serve as a semi-quantitative bioassay for metal availability in carbonates.

THE CYTOGENETICS OF FISH EGGS AS A MEASURE OF ENVIRONMENTAL QUALITY

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The New York Bight is one of the most heavily polluted areas of the Atlantic Ocean and, at the same time, the spawning grounds for large numbers of commercially valuable fish of great importance to United States fishermen. Almost 80% of the ocean dumping of municipal and industrial wastes of the mid-Atlantic states occur in this area. In addition, there is heavy atmospheric fallout of pollution to the Bight.

Research was conducted under contract to the Marine Ecosystems Analysis Project of NOAA, to determine what effect the heavy pollution was having on the cytogenetics of selected marine organisms.

Fish eggs were collected at sea in standard neuston nets towed at the surface. After collection the samples were fixed in 10% neutral formalin. After identification as to species the embryos were dissected off the eggs. The embryos were treated in 45-60% acetic acid for 15 minutes prior to staining. Single intact embryos were stained in a few drops of a solution of 19 parts of standard aceto-orcein stain to which 1 part of propionic acid had been added. The embryos were then analyzed for cytogenetic and cytological anomalies. Atlantic mackerel (Sumter scombrus) eggs were used for this study because of their relative abundance throughout the New York Bight and also because they are found in the heavily polluted surface waters.

Statistical analyses of the data indicated that stations with the fewest chromosomal anomalies occurred towards the periphery of the Bight and along the Long Island coast. This was with the exception of the two stations closest to the toxic chemical Deep Water Dumpsite 106. These two stations had the highest incidences of chromosome and mitotic abnormalities, One of the two was the only station with any significant number of dead eggs. An additional cruise the following year (1977) yielded similar results.

THE STRUCTURE OF A MUSSEL BED AND ITS ASSOCIATED MACROFAUNA. Lea, R.M., 378 Gooseberry Rd, Wakefield R.I. 02879.

Fourteen stations were located on a mussel bed in Fairfield, Ct, and sampled monthly from May, 1973, to April, 1974, to describe the microtopographical instability of a mussel bed, dominated by Mytilus adults and the seasonal and non-seasonal patterns of abundance and distribution of the associate macrofauna, Highest densities of the major species of the mussel bed occurred in August and September when water temperatures were highest. During this period, the structurally disturbed areas of the mussel bed supported the largest populations of Gammarus palustris, and the structurally undisturbed areas supported the largest populations of Melitia nitidia, Polydora ligni, Corophium insidiosum and Jaera sp. The success of the above species was attributed to their opportunistic habits. The disappearance of P. ligni, C. insidiosum, and Jaera sp. and the decline of G. palustris were related to the settlement of mussels. Furthermore, G. palustris and Melitia nitidia were limited by depositions of sand and gravel on the mussel bed. The populations of Balanus balanoides, Littorina littorera, and Mya arenaria were limited by structural changes of the mussel bed which resulted from the crawling behavior of the mussels, The only ubiquitous member of the mussel bed association was the extremely opportunistic species, Nereis succinea.

RECOVERY OF ZOOPLANKTON POPULATIONS WITHIN
THE INFLUENCE OF THERMAL EFFLUENT

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Our previous entrainment studies at a New Hampshire power plant suggested that when heated water re-enters the marine environment, mixing and species tolerances to the sublethal plume temperatures allow rapid recovery of zooplankton populations within the plume.

To test the rate of population recovery, plankton samples were collected at five stations: intake, discharge and three mixing zone stations. The mixing zone stations were not fixed sites; instead they were objectively selected during each sample period to provide a temperature gradient within the plume. Temperatures at the furthest chosen station in the mixing zone approached ambient. Live/dead ratios were determined for each sample and the G-test, a test of independence, was used to determine the significance of the dependency of mortality on station.

Results confirmed that zooplankton populations within the influence of the thermal discharge rapidly achieve proportions of live and dead individuals statistically indistinguishable from control stations as plume waters approach ambient temperature.

ANTIBIOSIS OF ULVA LACTUCA TOWARDS WINTER FLOUNDER
(PSELDOPLEURONECTES AMERICANUS) LARVAE.

BY: Donna A. Johnson¹, Grace Klein-McPhee² and Marilyn M. Harlin³

Ulva lactuca (L.), a green macroalga, is known to produce metabolites which are toxic to bacteria, algae and barnacles. We found that U. lactuca is also toxic to winter flounder (Pseudopleuronectes americanus Walbaum) larvae in 6 liter closed culture systems. Five grams of U. lactuca added to the experimental containers resulted in death of all larvae within 22 days, regardless of whether the algae was free floating or screened off from the larvae. Additional experiments showed that seawater from U. lactuca cultures killed winter flounder larvae and that mortality correlated inversely with the amount of Ulva water added. Survival of larvae in the controls was 19-38%. The measured standing crop of Ulva lactuca in Narragansett Bay, Rhode Island ranges from 5 g-m⁻² to 3000 g-m⁻². Possible implications of Ulva lactuca on local winter flounder larvae are examined.

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