

Environmentally Related Diseases of Marine Fish and Shellfish

CARL J. SINDERMANN

The significance of environmental stress from pollutants is emerging as an important determining factor in a number of fish and shellfish diseases. This stress may take the form of direct chemical-physical damage to cell membranes or tissues, modification of biochemical reactions, buildup of facultative microbial pathogens, low environmental oxygen levels, and many others. The presence of marginal or degraded estuarine/coastal environments may be signaled by the appearance of fin erosion, "red sores," lymphocystis, skeletal anomalies, and tumors in teleost fishes, by shell disease in crustaceans, and by certain neoplasms in bivalve mollusks, but a clear cause and effect relationship has not yet been demonstrated in every instance.

During the past decade, several diseases and abnormalities of fish and shellfish have been described that seem associated with pollutant stresses. These can be categorized and discussed as follows:

DISEASES CAUSED BY FACULTATIVE PATHOGENS RELATED TO CONTAMINANT STRESS

Included here would be "fin rot" or "fin erosion" in fish, a syndrome

which seems rather clearly associated with degraded estuarine or coastal environments. Fin rot has been reported from the New York Bight, the California coast, Puget Sound, Biscayne and Escambia Bays in Florida, Tokyo Bay, and the Irish Sea.

Also associated with badly degraded estuarine and coastal waters is a disease condition in Crustacea commonly referred to as "shell disease" or "shell erosion." This condition, which affects the gills in particular, is seen in crabs and lobsters, and in smaller crustaceans as well.

STRESS-PROVOKED LATENT INFECTIONS

There are at present published accounts of two viral diseases of marine invertebrates which suggest that latent infections may be provoked into patency by environmental stress. One, a baculovirus infection of pink shrimp, was first recognized in stressed laboratory populations. The other, a herpeslike virus infection of oysters, was discovered in a population held in a heated power plant effluent in Maine. A third viral infection—lymphocystis of striped bass—seems to have some tenuous association with heated effluents.

Carl J. Sindermann is with the Sandy Hook Laboratory, Northeast Fisheries Center, National Marine Fisheries Service, NOAA, Highlands, NJ 07732.

ENVIRONMENTALLY INDUCED ABNORMALITIES

Included here are a number of neoplasias in fish and shellfish, and skeletal anomalies in fish. Circumstantial evidence associating environmental contamination with neoplasms (tumors) in fish and shellfish has accumulated from a number of studies. Skeletal anomalies, particularly those of the vertebral column, fin rays, and gill rakers, have also been reported as common in certain fish species from degraded habitats.

GENETIC ABNORMALITIES

The mutagenic properties of a number of chemical contaminants, including heavy metals and pesticides, have been demonstrated in experimental studies with terrestrial animals, and there is some preliminary information that suggests high mutagenic prevalences in fish eggs and larvae from polluted coastal waters.

MISCELLANEOUS EXPERIMENTALLY INDUCED LESIONS

Of particular interest here are lesions in gills, livers, and neurosensory tissues of fishes induced by exposure to heavy metals, petroleum components, and halogenated hydrocarbons.

In conclusion, it should be emphasized that, except for experimental studies, much of the evidence associating fish and shellfish diseases with polluted environments is still circumstantial, but that the weight of such evidence is impressive and is increasing.

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