HERPES-LIKE VIRUS INFECTING PACIFIC-OYSTER LARVAE, CRASSOSTREA GIGAS

BY J.L. NICOLAS*, M. COMPS** AND N. COCHENNEC***

During the summer 1991, abnormal mortality and morbidity were noted in oyster larvae reared in hatcheries, in northern France. Attempts to reproduce the mortality experimentally suggested the possible occurrence of an infectious disease. During the course of these experiments, histological examinations revealed viral-like lesions in moribund larvae of the oyster C. gigas.

Important structural damage was noted in semi-thin sections of diseased larvae. Histologically, the lesions appeared confined to the connective tissue and mantle epithelium. Fibroblastic cells exhibited an unusual basophilia and were surrounded by paraspherical adjacent cells showing degenerative cytoplasmic changes (Fig. 1). The basophilic interstitial cells observed by electron microscopy contained intranuclear and intracytoplasmic viruslike particles (Fig. 2). The nuclear particles were circular or polygonal in shape, 70 ± 2.0 nm in diameter. Some particles appeared empty and are interpreted as being capsids; others contained an electron-dense brick-shaped core. The capsids, with or without core were irregularly scattered throughout the nucleoplasm (Fig. 3). The cytoplasmic particles, irregular in shape, measured 90 ±5 nm and exhibited an envelope formed by a trilaminar unit-membrane. They contained identically shaped and sized elements, with the same structure as the nuclear particles which were interpreted as being nucleocapsids. Envelope and capsid were separated by an electron-lucent gap of approximately 5 nm.

Although the viral nature of the particles cannot be conclusively determined without biochemical and biophysical characterization, the morphological characteristics, size range and cellular locations of the particles strongly suggest that they are closely related to the Herpes viruses (Matthews, 1982). Similar features, assumed to be herpes-like virus infection of the American oyster Crassostrea virginica, have been reported by Farley et al. (1972). In this case, the reported histological lesion were Feulgen positive intranuclear inclusions. Similar histological symptoms observed in Ostrea edulis and Mercenaria mercenaria were interpreted as possible herpetic lesions (Farley, 1978). The viral infection reported here is the second to be found in the larvae of C. gigas. The first one, associated with high larval mortality and named Oyster Velar Virus Disease (OVVD), was caused by a cytoplasmic DNA virus proposed to be an Iridovirus (Leibovitz et al., 1978; Elston, 1979; Elston and Wilkinson, 1985). The occurrence of a new viral infection in C. gigas larvae underlines the viral sensitivity of the different larval stages of this species.

Considering the economic importance of the Pacific oyster to the shellfish industry, it appears urgent to prevent the spread of the disease in oyster culture areas. In this regard, viral purifications are in progress in order to characterize the agent and to develop sensitive diagnostic methods for detection of possible carrier and eventually, to study transmission of the virus.

Summary
During transmission experiments of a supposed infections pathogen, viral lesions caused by a herpes-type virus were found in Pacific oyster larvae, Crassostrea gigas.

Acknowledgement
We thank J R. Bonami for his critical review of the manuscript.
References


Authors addresses

* Ifremer, Centre de Brest, 29280 Pluozane, France.

** Ifremer, GIE.RA, Chemin de Maguelonne, 34250 Palavas-les-Flots, France.

*** Ifremer, 12 rue des Resistants, 56470 La Trinité-Sur-Mer, France.

Fig. 1 - Histological section of diseased oyster larva. Toluidine blue. (Bar = 10µm).

Fig. 2 - Transmission electron micrograph of infected larval oyster tissue : intracytoplasmic particles (P). (Bar = 1µm)

Fig. 3 - TEM of portion of an infected cell showing unenveloped particles into the nucleus : empty viral capsids (Ve), capsids with electron dense core (Vf). Enveloped virions are present in the cytoplasm (VC). (Bar = 200 nm). Insert : detail of enveloped particles containing brick shaped electron dense core. (Bar = 100 nm).