Hemocytic neoplasia in the Chilean oyster (*Tiostrea chilensis*) cultured in the south of Chile. New record

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ABSTRACT: A neoplastic condition in the Chilean oyster *Tiostrea chilensis* is described. The condition is characterized by the infiltration and replacement of enlarged, atypical, and mitotically-active cells, apparently of hemocytic origin. The etiology of *Tiostrea chilensis* neoplasia remains uncertain.

Keywords: Neoplasia, *Tiostrea chilensis*, oyster, bivalve mollusc, pathology, diseases.

Neoplasia hemocítica en la ostra chilena (*Tiostrea chilensis*) cultivada en el sur de Chile. Nuevo registro

RESUMEN: Se describe una condición neoplásica de la ostra chilena *Tiostrea chilensis*. Esta condición se caracteriza por la infiltración y reemplazo de las células del tejido conectivo por células atípicas de gran tamaño mitóticamente activas, aparentemente de origen hemocítico. La etiología de la neoplasia en *Tiostrea chilensis* permanece incierta.

Palabras claves: Neoplasia, *Tiostrea chilensis*, ostra, molusco bivalvo, patología, enfermedades.

INTRODUCTION

The disease known as haemocytic condition has been found in a wide variety of marine bivalve molluscs (Peters, 1988). In oysters, this kind of neoplasia has been described for at least seven farmed species from around the world (Elston, 1994).

In Chile, an apparently similar condition in *Tiostrea chilensis* (Philippi, 1845) (= *Ostrea chilensis*) was reported by Mix and Breese (1980). This paper ratifies the suspected neoplastic condition previously reported and now found in several oyster farms in the south of Chile.

MATERIAL AND METHODS

The oyster were obtained from six farmer centers located near Calbuco (41°45'S, 74°45'W), Ancud (41°55'S, 74°50'W) and Castro (42°25'S, 74°55'W) south of Chile (Fig. 1), between June 1996 and January 1997. Tissue samples of mantle, digestive gland and gills were processed for histological analysis, fixed with a formaldehyde solution buffered with phosphate; dehydrated through ethanol series,

cleared in xylene and embedded in paraffin. Thin sections of 5 µm, stained with hematoxylin-eosin were scanned microscopically for detecting abnormalities and/or parasites.

RESULTS AND DISCUSSION

The neoplastic condition was found in 4.5% of the total examined specimens, most of the diseases animals were from Ancud and Calbuco. No positive cases were found in the oyster from Castro (Table 1).

The neoplastic oysters did not show external signs of the disease even though the histopathological analyses of most of the examined specimens presented a widely distributed proliferative tissue in the digestive gland and the mantle's connective tissue. The neoplastic tissue is characterized by atypical cells of abnormal size (9 to 12 µm in diameter), as compared with normal hemocytes (measuring from 6 to 10 µm in diameter); with a basophilic nucleus in the range of 8 to 10 µm in diameter, which largely overrides the normal hemocyte nucleus of 3 to 4

Figure 1. Location of study area and sampling sites.

Figura 1. Localización del área de estudio y sitios muestreados.

Figure 2. *Tiostrongia chilensis*. Histological section of digestive gland showing infiltration of connective tissue by neoplastic cells (N). Digestive tubules (T). Scale bar= 200 μ m.

Figura 2. *Tiostrongia chilensis*. Sección histológica de la glándula digestiva mostrando una infiltración del tejido conjuntivo por células neoplásicas (N). Túbulos digestivos (T). Barra= 200 μ m.

Figure 3. *Tiostraea chilensis*. Histological section of digestive gland showing severe infiltration of connective tissue by neoplastic cells (N) with associated necrotic digestive tubules (NT). Scale bar= 50 μ m.

Figura 3. *Tiostraea chilensis*. Sección histológica de la glándula digestiva mostrando una severa infiltración del tejido conjuntivo por células neoplásicas (N) asociados a túbulos digestivos necróticos. Barra =50 μ m.

Table 1. Number and percentage of *Tiostraea chilensis* with neoplasia in relation to the collection sites.

Tabla 1. Número y porcentaje de *Tiostraea chilensis* con neoplasia en relación con los sitios de recolección.

Sampling Locality	Area	Number of oysters	Neoplastic cases	%.
Quinhua Channel	Calbuco	28	1	4.7
Quetalmahue Bay	Ancud	25	1	4.0
Quempillén River	Ancud	27	2	7.4
Hueihue Bay	Ancud	59	4	6.7
Teupa	Castro	28	0	0.0

μ m. These are mitotically active cells with scarce cytoplasm. The condition is accompanied by the destruction of the digestive tubules.

Mix and Breese (1980) reported neoplasia cases in *Ostrea chilensis* from Chiloé Island, but failed to establish, whether the oysters were from natural or cultured populations, an important factor in order to discern the possible genetic or crowding effect that could be involved in the neoplastic condition of farmed oysters. Further investigations should be conducted on the natural oyster beds.

Currently the origin of the disease remains uncertain although some scientists associate the disease with the presence of a retrovirus, while others

suspect a relationship with chemicals derived from oil pollution (Cheng, 1993). Although the waters in the zone of study are considered within the most clean environments of the world, research results on chlorinated hydrocarbon pollution in sediments (Bonert, 1996), indicated accumulation points of DDT and or its metabolites (such as DDD and DDE). The area is not considered as of being of an important agroindustrial development, nevertheless its organochloride compound levels are comparable to those of largely industrialized areas. Therefore, it is not at all possible to discard the carcinogenic compounds as possible conditioning factors for this pathology.

Another releasing factor could be associated to genetics. Frierman and Andrews (1976), in due course of an intensive culture program of *Crassostrea virginica*, discovered groups of highly sensitive individuals to the occurrence of neoplasia, mainly in cultured oysters, while those from natural beds origin showed low numbers of neoplastic cases. Again, it is not as well possible to neglect the possibility of oncogenes implications in the development of neoplastic diseases in invertebrates.

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