

A CASE OF DISSEMINATED HAEMIC SARCOMA IN *CERASTODERMA (=CARDIUM) GLAUCUM* POIRET, 1789 COLLECTED FROM RÍA DE VIGO (NW SPAIN)

H. RODRÍGUEZ, M. SOTO, C. ARIAS & J. ESTÉVEZ^{**}

Laboratorio de Parasitología. Facultad de Ciencias del Mar. Universidad de Vigo, Apdo.: 874, Vigo, Spain.

Abstract

A case of a disseminated sarcoma of possible haemolytic origin in *Cardium glaucum* off the Ría de Vigo (NW coast of Spain) is reported in this work. On the basis of the morphological characteristics of the neoplastic cells and their distribution in the tissues we propose an haemocytic origin. Finally, we suggest a polyfactorial aetiology.

Introduction

Disseminated sarcomas of possible haemic origin (also named hematopoietic neoplasms) have been reported, during the past 20 years, in many species of marine and estuarine bivalve molluscs world-wide (Peters, 1988; Lauckner, 1983; Bower *et al.*, 1994). This type of diffuse neoplasm is of common occurrence in marine bivalves (Lauckner, 1983) and has been associated with shellfish mortalities on the east and west coasts of USA and Europe (Alderman *et al.*, 1977; Appeldoorn & Oprandy, 1980).

Material and Methods

In this study we have examined a total of 402 bivalve molluscs (64 cockles) collected from different locations off Ría de Vigo between November 1994 and September 1995. The specimens belonged to different species (12) of commercial bivalve molluscs collected in natural beds. Only one case of proliferative disease was observed (in a cockle *Cardium glaucum*) in the whole of bivalves studied. Bivalves were fixed in Davidson's fluid, processed using routine histological techniques, sectioned at 4 mm and stained with Mayer's haematoxylin and eosin. This cockle neoplasm was archived in the RTLA (accession number 6296).

Results and Discussion

No gross abnormalities were recognisable

externally in the neoplastic specimen, but the histopathological analysis showed a heavy population of enlarged neoplastic haemocytes which had infiltrated the extravascular spaces in all tissues (Figures 1A, B). Blood spaces (haemolymph sinuses) of the cockle were occluded by these abnormal cells, being the vascular channels of the gills (Figure 1A) the most striking site, they were obstructed by massive emboli of neoplastic haemocytes that distended the channels, causing a distortion of the gill architecture and a reduction of interlamellar spaces.

The histological examination also revealed abundant mitotic figures (Figure 1C) and mononucleated and multinucleated hypertrophied cells. The enlarged haemocytes were relatively monomorphic and had a thin hyaline ring of eosinophilic cytoplasm around a spheroid, slightly indented nucleus with dense nuclear granules that usually obscured the nucleolus. These round and hypertrophied cells showed a higher nucleus : cytoplasm ratio than normal haemocytes.

On the basis of the morphological characteristics of the neoplastic cells and their distribution in the tissues, we have considered this abnormal haemocytic condition as a possible disseminated sarcoma. With regard to the cytogenesis of tumour cells we suggest, as other authors in similar conditions (Poder & Auffret, 1986) an haemo-

^{*} Corresponding author

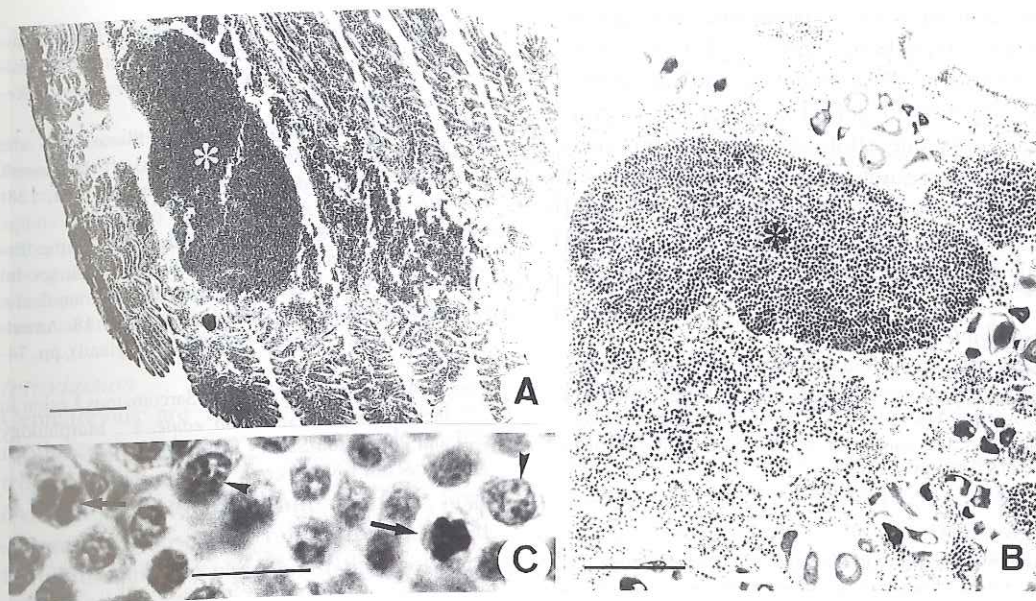


Figure 1. Histological sections that illustrate haemocytic neoplasia in *Cardium glaucum*. All sections were stained with haematoxylin and eosin. **A:** Dense infiltration of the gill filaments by neoplastic cells filling haemolymph vessels and causing a vascular occlusion (white asterisk). Scale bar: 250 μ m. **B:** Sarcoma cells in gonadal region (black asterisk). Scale bar: 150 μ m. **C:** Neoplastic haemocytes characterised by hyperchromatic enlarged nuclei (arrow heads). Note the presence of mitotic figures (arrows). Scale bar: 15 μ m.

cytic origin. The diffuse nature of our neoplasm supports this hypothesis since the tumour cells were located in interstitial spaces (connective tissue) and blood spaces, such as tissue and circulating haemocytes; however, there is no definite evidence.

Another enigma about disseminated sarcomas, and neoplasms in general, is the aetiology of the disease. Various etiologic agents have been proposed in different studies about neoplasms: pollutants, viruses and oncogenes.

Some scientists have attributed bivalve neoplasms to environmental pollution (Peters, 1988), nevertheless, since disseminated sarcomas have been found in molluscs from a diversity of regions with and without obviously contaminated sediments (Pekkarinen, 1993; Mix, 1986; Poder & Auffret, 1986), it is highly questionable that pollutants could induce such disorders. Virus infections have also been suggested as the cause of bivalve sarcomas (Peters, 1988), but we have not achieved the adequate studies to detect

them in this case. The histopathological analysis revealed an infection by oocysts of *Nematopsis* sp. but, since they were present in most of the non neoplastic bivalves as well, we have not considered them as a causative factor of neoplasm. The

third possible causative factor, activation of cellular oncogenes, has been implicated in the development of neoplastic diseases in many invertebrate species (Peters, 1988; Pekkarinen, 1993; Poder & Auffret, 1986). As there is no definitive evidence to consider only one etiologic agent for this neoplasm; we suggest that an interaction of different factors, especially environmental conditions and genetics may have induced this case of an hematopoietic sarcoma.

Acknowledgements

We are very grateful to Dr. J. C. Harshbarger, Registry of Tumors in Lower Animals (The George Washington University, USA) for his evaluation of our specimen. This work was supported by Xunta de Galicia (Project XUGA 30106A96).

References

Alderman, D. J., Van Banning, P., Perez-Colomer, A. (1977). Two European oyster (*Ostrea edulis*) mor-

- talities associated with an abnormal haemocytic condition. *Aquaculture* **10**, 335-340.
- Bower, S. M., McGladdery, S. E. and Price, I. M. (1994). Synopsis of infectious diseases and parasites of commercially exploited shellfish. *Annual Review of Fish Diseases*, **4**, 1-99.
- Lauckner, G. (1983). Neoplasia. In: *Diseases of Marine Animals*. Volume II, Bivalvia to Scaphopoda. (Kinne, O. ed.). Biologische Anstalt Helgoland, Hamburg. pp. 863-879.
- Mix, M. C. (1986). Cancerous diseases in aquatic animals and their association with environmental pollutants: a critical review. *Marine Environmental Research* **20**, 1-141.
- Pekkarinen, M. (1993). Neoplastic diseases in the balthic *Macoma balthica* (Bivalvia) off the Finnish coast. *Journal of Invertebrate Pathology* **61**, 138-146.
- Peters, E. C. (1988). Recent investigations on the disseminated sarcomas of marine bivalve molluscs. In: *Disease Processes in marine bivalve molluscs*. (Fisher, W. S. ed.). Special Publication **18**. American Fisheries Society. Bethesda (Maryland), pp. 74-92.
- Poder, M. & Auffret, M. (1986). Sarcomatous Lesion in the Cockle *Cerastoderma edule*. I. Morphology and Population Survey in Brittany, France. *Aquaculture* **58**, 1-8.