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Histopathology of Zinc exposition in *Actinia equina* L. (Anthozoa, Actiniaria)

J. Gadelha*,**, C. Ferreira*, A.M.V.M. Soares*, M. L. Pereira*** and F. Morgado*

* CESAM & Departamento de Biologia, Universidade de Aveiro, 3810-193 Aveiro, Portugal
**CAPES Foundation, Ministry of Education of Brazil, Brasília – DF 70040-020, Brazil
***Departamento de Biologia & CICECO, Universidade de Aveiro, 3810-193 Aveiro, Portugal

Zinc is a trace metal that is regularly found at pollution sites, amongst other metals and pollutants, contributing to the toxicity of marine ecosystems [1]. In this study zinc acute toxicity tests were conducted on the sea anemone *Actinia equina*. This sea anemone presents a wide geographic distribution on rocky shore marine habitats, is quite resistant to some degree of various forms of contaminants and plays an important ecological key role in the marine environments.

After a period of acclimatising on a flow through system, organisms of the same average size were exposed to different concentrations of zinc solution during a period of 96 hours (0 µg/l, 10 µg/l, 50 µg/l, 100 µg/l, and 200µg/l). The histological processing of the specimens was performed using standard procedures, slightly modified due to the peculiar nature of the biological material.

The general effects exhibited necrosis of tentacles, mesenterial filaments, and in the gastrodermal regions (Figures 1, 2 and 3). It were observed tentacular cysts, black particulate accumulations in the gastrodermis, hypertrophied cells in the lobes of the mesenteries filaments, and spirocyst and associated necrosis (Fig. 2-3). All anemones exhibited extensive areas of tissue necrosis, degeneration of the epidermis in various stages, with loss of mucous cells, vacuolation, necrosis and ptychocysts from the epidermis, necrosis of retractor muscles and ducts (Figures 2-3). Neoplasms of the gastrointestinal tract and gonads were observed in internal structures. In the former, modifications of the mesenteries such as intensive fragmentation, vacuolization and epithelial thinning and in the latter abnormal gonad development and necrosis were noted (Figures 2-3).

The data suggests that *Actinia equina* may be adversely affected by acute exposures to high levels of zinc as seen during laboratory exposures of other invertebrates [2, 3] and is also probably sensitive to acute exposures to metal's toxic sediments in the marine environment [2,3]. The loss of mucous secretory cells and ptychocysts from the epidermis suggest that energy reserves for cell replenishment were adversely affected. Mucus production in benthic cnidarians is necessary to prevent burial by sedimentation and to protect against toxins or invading microorganisms. The serious effects on the gastrodermis integrity indicate that sea water in the coelenteron is no longer circulated. The observed modifications could be considered as a general cnidarians response to stress [2, 3].

Further investigations of bioaccumulation, physiology, and histopathology in this anemone and other anthozoans from polluted environments should prove to be valuable in pollution monitoring studies, as they have for other benthic invertebrates

References

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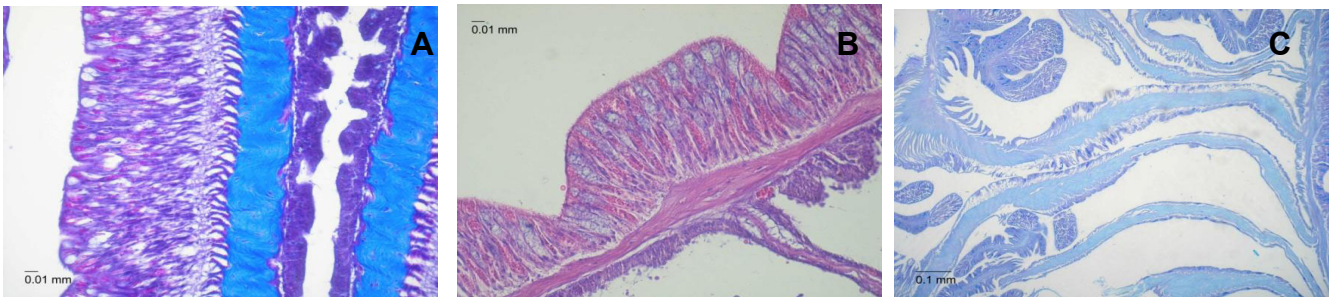

Figure 1: Details of control. A – Tentacles (Trichrome Masson); B – Epidermis Trichrome Mas C-Mesenterial filaments (PAS) (Bar: 0.04 mm)

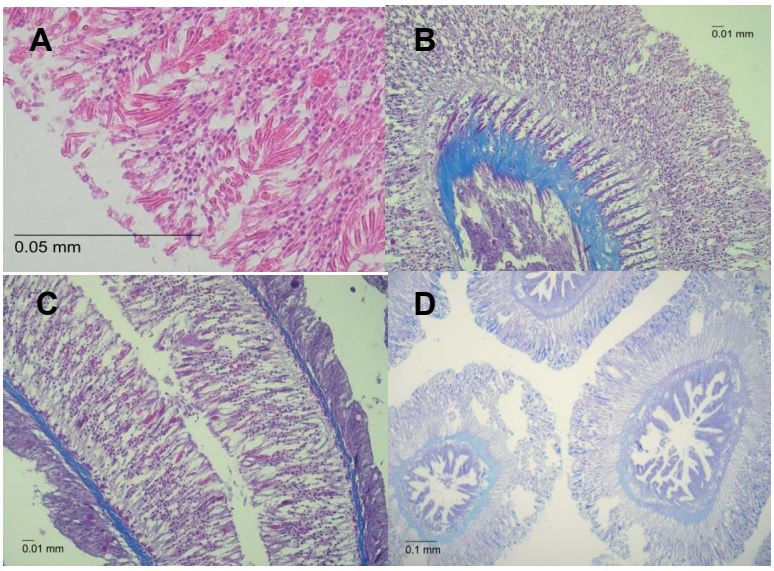

Figure 2: Treatment with zinc solution 200 µg/L – Effects on tentacles. A – Desegregation of cellular membranes in the top epidermical cells (H&E). B - Desegregation of cellular membranes in the top epidermical cells (Trichrome Masson). C - Epidermis with destroyed tissues (Trichrome Masson). D – Dermis with destroyed tissues (PAS) (Bar: 0.01 mm and 0.04 mm)

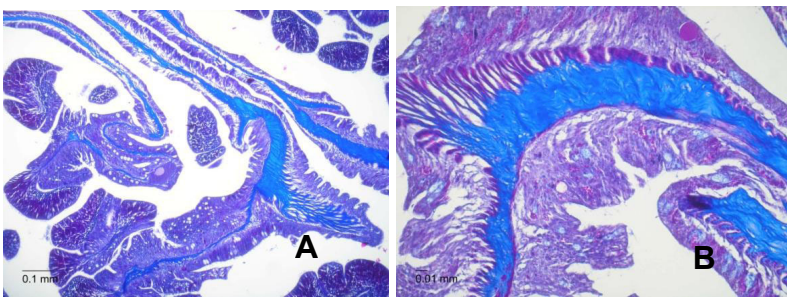

Figure 3: Treatment with zinc solution 200 µg/L – Effects on internal structure. A – Details of mesenterial filaments with vitelogenic oocytes (Trichrome Masson). B – Details of the retractor muscle and gastrodermis (Trichrome Masson). (Bar: 0.01 mm)

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