



Effects of increasing temperatures on biomarker responses and accumulation of trace elements in the Ark shell (*Arca noae*) from Bizerte lagoon

Feriel Ghribi^{1*}, Jonathan Richir², Safa Bejaoui¹, Dhouha Boussoufa¹, M'Hamed ELCafsi¹ and Sylvie Gobert²

¹ Tunis El Manar University, Tunisia

² University of Liège, Belgium

The Bizerte lagoon is one of the most studied coastal areas in Tunisia, it is used for shellfish production since 1964 and supports various industry and agriculture activities. This lagoon inhabit a wide diversity of marine invertebrates, among them the valuable shellfish Noah's ark (*Arca noae*). The present study examines the influence of increasing temperature on biochemical biomarkers and metal bioaccumulation in the the total edible tissue of *Arca noae*. Samples were collected during winter 2013 and summer 2014 in the southern sector of the lagoon far from urban and industrial sources of pollution but this site remained influenced by agricultural inputs. After collection, Ark shells were immediately transferred to the laboratory and prepared for analysis. Five oxidative stress biomarkers: metallothioneins (MTs), malondialdehyde (MDA), glutathione peroxidase (GPx), reduced glutathione (GSH) and acetylcholinesterase (AChE) were monitored as a response to ten trace elements bioaccumulation (Ni, Cr, Cd, Fe, Zn, Mn, Al, Cu, Se and Pb). The rise of temperature from 12°C in December to 28°C in July coincided with the bioaccumulation of trace metals, the high expression of MDA, GPx, GSH and MTs and the inhibition of AChE activity in *A. noae* tissues. Statistical analysis (Spearman's rank correlation) showed that all trace elements and biomarkers were significantly positively correlated with T, with the exception of Zn, Cd and AChE that was negatively correlated with this parameter. The increase of TE levels in Ark shells during summer may be due to a possible increase in the concentration of metallic elements in the lagoon waters. However, a possible contamination by runoff from adjacent farmland is to be rejected in view of the drought and the scarcity of the rains in this season. Hence, we assume that increasing concentrations of trace elements in *A. noae* tissues in summer is probably related to the evaporation process due to increased temperature that favors the concentration of these trace elements in the Bizerte lagoon. Thus, T (°C) appears to be a determinant factor on the variability of biomarker responses and metal bioaccumulation in *A. noae*. Overall, the combined effects of chemical contamination and increased temperature in summer appear to induce a highest metabolic adaptation response and can therefore be used to determine thresholds of effectiveness and facilitate the interpretation of monitoring biomarkers.

Keywords: Ark shells, Bizerte lagoon, Trace Elements, Oxydative stress, bioaccumulation

Conference: IMMR'18 | International Meeting on Marine Research 2018, Peniche, Portugal, 5 Jul - 6 Jul, 2018. **Presentation Type:** Poster Presentation

Topic: Biodiversity, Conservation and Coastal Management

Citation: Ghribi F, Richir J, Bejaoui S, Boussoufa D, ELCafsi M and Gobert S (2018). Effects of increasing temperatures on biomarker responses and accumulation of trace elements in the Ark shell (*Arca noae*) from Bizerte lagoon. *Front. Mar. Sci. Conference Abstract: IMMR'18 | International Meeting on Marine Research 2018*. doi: 10.3389/conf.FMARS.2018.06.00149

Received: 06 May 2018; **Published Online:** 27 Jul 2018. * **Correspondence:** Dr. Feriel Ghribi, Tunis El Manar University, Tunis, Tunisia, ferielghribi@yahoo.fr