## How are metals associated with stress responses in captive crocodilians? The case of *Crocodylus moreletii*

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<u>Abstract</u>: Several studies on metal exposure in crocodilians has been performed worldwide. Nonetheless, few studies have investigated the effects of metals in the health and physiology of these reptiles. Hence, we evaluated the association of five metals of ecotoxicological importance (Hg, Cd, Pb, Cu and Zn) with the neuroendocrine response to stress and oxidative stress in 42 captive female Morelet's crocodiles (Crocodylus moreletii). We measured glutathione (GSH) and glutathione disulfide (GSSG) as markers for antioxidant system and thiobarbituric acid reactive substances (TBARS) for oxidative damage in the liver, and corticosterone (B) as biomarker of the neuroendocrine response to stress in blood plasma. The mean  $\pm$  SD concentrations of metals in the liver expressed in  $\mu g/g$  (dw) were: Cd: 0.004  $\pm$  0.003, Hg: 0.014  $\pm$  0.019, Cu: 0.017  $\pm$  0.013, Zn: 0.043  $\pm$  0.035, Pb: 0.16  $\pm$  0.256. The mean  $\pm$  SD levels expressed in nmol/mg protein for the oxidative stress biomarkers were: GSH:  $0.42 \pm 0.35$ , GSSG:  $0.24 \pm 0.20$  and TBARS:  $0.36 \pm 0.21$ . The mean  $\pm$  SD concentration of B was:  $393.57 \pm 405.14$  pg/mL. We observed a significant negative relationship between Hg and B. Cd had a negative relationship with both GSH and GSSG; meanwhile, Zinc showed a negative relationship with TBARS levels. For the first time we observed that B had a negative relationship with oxidative damage in crocodilians. The connections found between Hg and the neuroendocrine response to stress as well as Cd with antioxidant activity, and on the other hand Zn and B with oxidative damage should be studied further, due to their toxicological importance and implications for the conservation of C. moreletii and other crocodilian species.

Keywords: Biomarkers, Corticosterone, Oxidative stress, Pollutants

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