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Composition of zooplankton resting eggs bank as indicator of long-term exposure to metals in an Atacama Desert lagoon

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Geochemical signatures in hydrologically closed-basin lakes, especially in arid regions can be interpreted as changes in past environmental conditions.
Inca Coya (22º20'S-68º35'W) is a small and shallow (18 m) lagoon located 2534 m.a.s.l in the Antofagasta region, northern Chile. The lagoon connects to a shallow upper aquifer well that is tightly coupled to Salado River, as it is located <500 m from it, near its juncture with Loa River. Salado River is arsenic-enriched by water from the El Tatio geothermal fields, reaching levels up around 30 mg As L-1. The extremely arid conditions and high evaporation maintain high concentrations not only of arsenic but also of copper, boron, chloride, sulfate and others throughout the Loa River's course. Also, Chiu-Chiu village is near than several open-pit copper mines and some large mine tailings. We previously found high concentrations of total metals in Inca-Coya lagoon surface sediments which are in the range of or higher than those found in mining-impacted water bodies.
Zooplankton egg banks in lake sediments provide an excellent system for reconstructing conditions experienced before and during diapause (in which resting eggs are produced), because layered deposits retain both resting eggs and traces of the chemical and biological conditions present in the water column at a given time.
The objective of this study was to analyze the structure of the rotifer resting eggs bank and the geochemical composition of the sediments of Inca Coya Lagoon, in order to identify the consequences of periods of higher inputs of heavy metals on plankton communities.
Drilling was done with a gravity core and additionally with Ekman-Birge bottom sampler. Sedimentological analyses were also made to determine organic matter (LOI 550ºC), carbonates (LOI 950ºC), magnetic susceptibility, XRF and XRD scanning.
Three rotifer species were identified from water column and diapausing states from eggs banks in the sedimentary sequence: Brachionus 'Nevada', B. quadridentatus and Hexarthra sp. The first two species were the most dominant and abundant in the water column, but Hexarthra was the most dominant in the sediment record. There was observed a change in the frequency of resting eggs: Hexartha eggs were significantly dominant in the deepest sediment fraction, and diminished in recent sediment. Resting eggs assemblage was associated to fluctuation in the proportion of organic matter and alternation of carbonates (top) and silicates (deep), and to counts of As (greater in intermediate zone) and Cu (greater at upper zone).
The rotifer communities from lagoons in Atacama Desert and Altiplano offer an excellent system to study long-term ecological and evolutionary response to extreme environmental conditions on populations and community structure, specifically exposure to high concentration of metals.