

STABLE ISOTOPE GEOCHEMISTRY AND LIVE/DEAD ESTIMATES IN PRESENT-DAY BRACHIOPOD ASSEMBLAGES AS TOOL IN CONSERVATION PALEOBIOLOGY: A CASE STUDY IN THE SOUTHEAST BRAZILIAN BIGHT (SBB), SOUTH ATLANTIC

Theme: Biodiversity conservation indicators

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Introduction: Mismatches between the composition of time-averaged death assemblages (shelly remains sieved from the upper mixed-zone of the sedimentary column) and local living community are typically assigned to natural taphonomic processes. However, recent live-dead (LD) data, plus geochemical analyses in time-averaged shells of *Bouchardia rosea*, from nearshore sites of the SSB (Ubatuba coast) indicate that the high levels of LD mismatch are linked to natural and/or anthropogenic ecological changes. **Goals:** Here we document live-dead comparisons for assemblages of brachiopods found in upwelling-influenced sites of the shelf break and continental slope of the SBB (depth range 99-500m, 23°45'S-29°59'S). This is the first comparative live-dead study of brachiopod assemblages conducted in relatively deep waters in low-latitude environments. **Material and Methods:** Brachiopods were acquired from 28 collecting sites, via Van Veen grab sampler and dredges. The fidelity estimates (LD) were obtained by direct comparisons of live biota with dead shells, carried out separately at each sampling station. **Results:** In total, 2393 specimens of *B. rosea* were found, 2342 (97.9%) are dead and only 51 (2.1%) were found alive. Ten is the maximum number of specimens found alive per station. These occur in depths ranging from 150 to ~240 meters, only in mixed *lithoclastic-bioclastic* bottoms. However, in some sites other brachiopods (*Platidia*, *Terebratulina*, *Argyrotheca*) were alive in direct association with dead shells of *Bouchardia*. All studied specimens are small (<12.4mm). **Conclusions and Future Directions:** The striking discordance between the abundant occurrences of dead brachiopods and their extreme scarcity among the living fauna indicates a remarkably poor fidelity (=high LD mismatch/2.1%-97.2%). *Bouchardia* populations have become locally scarce or even extinct in the study area, and the small sizes of individuals indicate high mortality rates in juvenile cohorts. Why? To answer this, oxygen/carbon isotopes ($\delta^{18}\text{O}/\delta^{13}\text{C}$) of brachiopod shells are now being employed to check the following: (a) is the LD mismatch of *Bouchardia* assemblages linked to changes in upwelling currents and/or primary productivity? (b) how comparable is the isotope signature of *Bouchardia* shells that grew in nearshore and in deeper sites? (c) is the isotope signature of co-occurring living brachiopods similar to that of dead shells of *Bouchardia*? Finally, LD mismatch is generally regarded as a hindrance to paleoecological analyses, but as shown here it might be used neontologically to identify shifts in community composition in the absence of direct historical data, with anomalous dead occurrences of species (*i.e.* *Bouchardia*) providing valuable insights into past populations.

Keywords: Conservation Paleobiology, Stable Isotope Geochemistry, Historical Ecology, Quaternary, Brachiopods.

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