

Kowalewski, M. J. 1995. Quantitative taphonomy, ecology, and paleoecology of shelly invertebrates from the intertidal environments of the Colorado River Delta, northeastern Baja California, Mexico. Ph.D. dissertation. University of Arizona. Tucson, Arizona. 348 pp.

This dissertation summarizes actualistic research in the intertidal environments of northeastern Baja California, Mexico.

The first project is a taphofacies analysis of three generations of cheniers that differ in age and taphonomic history. The study shows that the shells that accumulated in the cheniers are slightly affected by biological processes and moderately affected by physical processes. Only the luster features of shells vary substantially and consistently with chenier age--a result of subaerial weathering. Taphofacies analysis successfully discriminates the three chenier generations. Chenier assemblages are distinct from assemblages formed in other marine environments by a lower frequency of bioerosion and encrustation. Taphonomic differences between the cheniers that differ in age suggest that fossil cheniers may be useful in detecting incompleteness gradients along stratigraphic boundaries (i.e., taphofacies with shells of poorer-than-average preservation indicate a longer subaerial exposure and thus a larger stratigraphic hiatus).

The second project investigates the taphonomy of a Recent lingulide brachiopod *Glottidia palmeri* Dall. Live lingulides occur in patches across the intertidal zone. Dead specimens include in situ shells, surface shells (found on intertidal flats), and beach shells (found on the shoreface). Recent lingulides have a very low fossilization potential. Consequently, large-scale aspects of their history are poorly recorded in the fossil record, but the outcrop-scale aspects may be recorded with high fidelity. The literature survey suggests that Paleozoic lingulides had a higher fossilization potential than their post-Paleozoic relatives. The decrease in diversity and ecologic importance of lingulides after the Paleozoic may be due to a taphonomic megabias.

The third project proposes a comparative use of size-frequency distributions derived from trace fossil assemblages for interpretation of ancient populations. Two examples illustrate the approach: Recent lingulide burrows (Baja California) and Cambrian Diplocraterion burrows (Arizona). They show that the approach can provide accurate data useful for paleoecology, sedimentary facies analysis and even local stratigraphic correlations.

The fourth project is a theoretical essay on the concept of time-averaging and the concluding part of the dissertation discusses the pitfalls and premises of the actualistic approach in the context of my research in Baja California.