BURROWING BEHAVIOR OF THALASSINIDEAN SHRIMP IN A BAHAMIAN INTERTIDAL CARBONATE SAND FLAT

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Burrowing by thalassinidean shrimp in modern tropical, shallow subtidal to intertidal carbonate sedimentary environments is near-ubiquitous and commonly is a powerful agent of bioturbation. Deep and intense burrowing by callianassids occurs on the intertidal margins of Pigeon Creek on San Salvador Island, Bahamas. Here extensive sand flats along both the south and north arms of this slightly hypersaline lagoon are thoroughly bioturbated by the callianassid shrimp *Glypturus acanthochirus*. In addition to dominating the deep burrow tier, the burrowing activity of these callianassids results in the formation of a highly irregular intertidal surface. Large burrow mounds commonly coalesce, and these composite surfaces become stabilized by the development of a *Schizothrix*-dominated microbial mat. The stabilized surfaces set the stage for burrowing by the upogebid shrimp *Upogebia vasquezi* and by several species of fiddler crabs, including *Uca major*.

The burrows of *Upogebia vasquezi* are particularly distinctive and reveal interesting aspects of shrimp behavior. Burrow openings occur only on stabilized mound surfaces and are arranged in patterns of 4. Resin casts reveal an interlocking but unconnected pair of U-shaped burrows that penetrate 10-12 cm into the substrate, each with a consistent inside diameter of 6-8 mm; these are permanent dwellings for the shrimp. Typically there are two short (2 cm or less) oblique shafts that branch from the basal area of each "U". The burrow system bears a remarkably thick, highly cohesive lining that encapsulates the double-U form. This lining can be > 2x the inside diameter of the burrow and up to 5 cm in total thickness; the exterior surface reveals an irregular arrangement of well-agglutinated pellets up to 1.2 cm in diameter and formed of the host sediment.

Can core samples of paired *U. vasquezi* burrow systems yielded 1 female and 1 male shrimp per pair. Thus each U-shaped burrow appears to be inhabited only by one shrimp, and the U's seem to form an obligatory female/male pair system. Questions remain concerning mating strategy, function of the short shafts that branch from the base of the "U", and the energetics of mucus production sufficient to cement the volume of sediment represented by the thick burrow linings.

Because of their thick, well-cemented linings, these upogebid burrows have high potential for fossilization. The well-pelleted exterior surfaces of the burrows suggest that fossil forms could be assigned to the ichnogenus *Ophiomorpha*, although other significant differences in form are apparent. Furthermore, if these burrows truly are limited to lagoonal, intertidal enviroments, they could be excellent indicators of paleoenvironment and past sea-level position. Casts of fossil burrows bearing close similarity to the form of the modern burrows have been found in late Pleistocene rocks thought to have been deposited in a lagoonal setting on San Salvador.