

Endoparasitic bivalves in Philippine palaeopneustid sea urchins (Echinoidea: Spatangoida)

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Recently, a large number of Philippine upper shelf sea urchins (Echinodermata: Echinoidea) became available, presumably due to shifting of local fishing activity from over-exploited shallow water habitats to deeper areas. The use of tangle nets and bottom fishing accounts for a huge number of by-catch, including echinoids. The faunal spectrum recovered from these fishing nets is rather selective, consisting mainly of large and epifaunal species, while burrowing or small species are underrepresented. Among the echinoids recovered, members of the genus *Plesiozonus* (Irregularia: Spatangoida) are especially large, often exceeding 120 mm test length and are thus commonly collected by the fishermen. Previously, *Plesiozonus* species were known by very few specimens only. Consequently, little is known on their biology, ecology, and physiology. While cleaning specimens of *Plesiozonus hirsutus*, we discovered double-valved bivalves in their rectum. Our first assumption, namely that these animals were simply swallowed by the deposit-feeding sea urchins proved to be unlikely: in every specimen with preserved intestine, a single articulated bivalve was located close to the periproct and contained mummified tissue. This strongly suggested that the bivalves were actually living inside the intestine of the sea urchins, rather than having been accidentally swallowed during feeding. Considering the size of the bivalves, which approaches or exceeds that of the respective echinoid peristome, the latter possibility seems even less likely. The bivalves are characterized by an extremely thin shell as well as a reduced hinge region and represent yet unknown galeomatid or montacutid species. Both taxa are known to live in association with echinoderm hosts, mainly holothurians. From sea cucumbers, the minute endoparasite *Entovalva mirabilis* has been reported. In echinoids, endoparasitic bivalves have not yet been described, although three galeomatid species are known to live externally attached to the periproct of the spatangoid *Brissus latecarinatus*. We hypothesize that it is probably only a small evolutionary step from such a life style to an endoparasitic one. Especially so, as *Entovalva* has been observed to actively force its way back into the intestine of its holothurian host when artificially removed.

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