



## EMBRYONIC DEVELOPMENT OF SLIPPER LOBSTERS, *Ibacus ciliatus* (von Siebold, 1824) AND *Ibacus novemdentatus* Gibbes, 1850

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A clear understanding of embryonic development and hatching time of slipper lobsters is critical for developing their aquaculture practices. The purpose of the present study was to understand and define each embryonic stage of slipper lobsters, *Ibacus ciliatus* (von Siebold, 1824) and *Ibacus novemdentatus* Gibbes, 1850. It presents a comparative description of the embryogenesis of these two economically important species. Ovigerous females caught from the wild were cultured in laboratory until hatching. From sampling until hatching the morphological characteristics of embryos including the development of compound eyes, appendage formation, appearance of chromatophores, presence of heartbeat, and yolk consumption were examined with randomly sampled embryos from the females' pleopods. This study defines six distinct stages of embryonic development for both species. The developmental patterns of both species were found to be remarkably similar, with minimal variation in morphological features such as embryo diameter. In the first stage, the embryos were entirely surrounded by yolk. As development progressed, the yolk volume gradually decreased, leading to the formation of a gap between the embryo and the surrounding membrane by the second stage. The appearance of the eyespots marked the third stage, accompanied by further reduction in yolk. In later stages, compound eyes became larger and eventually completed, chromatophores began to appear, appendage formation continued, the heartbeat became visible, and the yolk continued to reduce. These criteria for embryonic stages proposed in this study serve as a fundamental framework for understanding the embryology of these two species and support efforts to standardize embryonic staging across slipper lobster taxa. The close similarity in embryonic progression suggests that unified hatchery protocols may be applicable for both species, facilitating their future inclusion in sustainable aquaculture systems.

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