

LIFE CYCLE ASSESSEMENT OF THE PHOTOSYNTHETIC SEA SLUG *Elysia crispata*

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Abstract: *Elysia crispata* is a sacoglossan sea slug that retains intracellular functional chloroplasts acquired from their macroalgal food sources. This photosynthetic sea slug has lecithotrophic development and stolen chloroplasts (kleptoplasts) are not transmitted vertically (i.e., are absent in eggs and larvae). In this study, sixteen egg masses were monitored during development and a photographic record was made of the most relevant stages: i) fertilized eggs; ii) veliger larvae; iii) post-hatching juveniles; iv) 3-5 days post-feeding juveniles; v) >10 days post-feeding juveniles; and vi) adults. The time span between egg deposition and juvenile hatching was about 14 days. Veliger larvae formed 4 days post-spawning (dps), while stomach and statocysts were visible within 6-7 dps. Metamorphosis was intracapsular. Post-hatching juveniles of *E. crispata* began feeding on *Bryopsis plumosa* within 3-5 days, digesting the macroalgal tissue while incorporating functional chloroplasts. Five months after hatching, when the slugs reached sexual maturity, they started laying egg masses. Identification and control of the different development stages of *E. crispata* and the timing of chloroplast acquisition will contribute allow analysing sea slugs at these different stages, leading to the elucidation of kleptoplasty in sacoglossan sea slugs. Furthermore, the optimization of culturing protocols significantly reduce the number of wild specimens needed for laboratorial experimentation and mitigate the impact of sampling on natural populations.

Key words: *Bryopsis plumosa*, kleptoplasty, larval development, photosynthesis, Sacoglossa.

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