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Oxygen consumption of a single embryo/planula in the reef-building coral Acropora intermedia

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Abstract:

O2 consumption of a single embryo/planula at each developmental stage was monitored in the reef-building coral Acropora intermedia using an optical O2-sensing system with our original micro-chamber system (6.28 μl). The lowest rate of O2 consumption was observed in unfertilized eggs. After fertilization, O2 consumption increased and remained constant until the prawn chip blastula stage. However, O2 consumption began to increase again during the bowl-shaped blastula stage, which involves the formation of 2 germ layers and corresponds to the beginning of gastrulation. The rate of O2 consumption peaked during the teardrop-shaped planula stage. During this stage planulae are able to swim actively, especially in the vertical plane, so an increase in energy consumption during this stage is to be expected. O2 consumption began to decrease gradually 5 d after spawning. At this stage, the larvae frequently touched the substrate with their concave aboral end, which features numerous spirocysts required for substrate attachment. When the planulae began to settle, 7 d after spawning, the rate of O2 consumption dropped to that of unfertilized eggs, suggesting that the planulae slowly use stored energy for crawling/settlement behavior and/or post-settlement growth and survivorship.

Key-words: Development, dispersal, energy, larva, lecithotrophic, metabolism, recruitment, settlement, competency period