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

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Abstract:

O_2 consumption of a single embryo/planula at each developmental stage was monitored in the reef-building coral Acropora intermedia using an optical O_2-sensing system with our original micro-chamber system (6.28 µl). The lowest rate of O_2 consumption was observed in unfertilized eggs. After fertilization, O_2 consumption increased and remained constant until the prawn chip blastula stage. However, O_2 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 O_2 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. O_2 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 O_2 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