Move-over parrot fish – coral embryos make next-gen mucous cocoon

Gerard F. Ricardo a,b,c,*, Ross J. Jones d, Peta L. Clode e, Andrew P. Negri b,c
a Centre for Microscopy, Characterisation and Analysis, University of Western Australia, Crawley, W.A, 6009, Australia
b Australian Institute of Marine Science, Qld & W.A, Australia.
c Western Australian Marine Science Institution
*Ph: (07) 4753 4423, email: g.ricardo@aims.gov.au

Summary
Coral are known to use a variety of mechanisms for sediment removal. Here we report a previously undescribed mechanism of mucous cocooning in embryonic corals. Given the recent surge of interest surrounding coastal development and dredging, it is important to understand methods corals can cope with increases in turbidity and sedimentation.

Design
In a series of experiments, embryos of various ages (3-72 h) were exposed for 12 h periods to elevated suspended solids using inshore and offshore sediments. Embryos and larvae were assessed for survivorship, cocoon formation, cocoon emergence and settlement.

Key Points
• Cocooning observed in as low as 30 mg L⁻¹*.
• Cocoon composed of mucous and incorporated sediment.
• Once ciliation occurred, cocooning was rare.
• Newly ciliated larvae ripped open and exited cocoons through gyration.
• Inshore (mineral-rich) sediment caused greater cocooning than offshore (calcium carbonate) sediment.
• Observed in A. millepora and A. tenuis.

*typical of suspended solids recorded during a windy day

Mucous cocoons offer protection in some marine organisms. Coral embryo (left), parrot fish (right).

Impacts of sediment on embryo survivorship, cocoon formation and emergence, and settlement. Panel A) Dose-response of inshore suspended solids on cocoon formation of Acropora millepora. Panel B) The proportion of larvae emerging from their cocoons over time after being transferred to clean seawater. Panel C) The proportions of survivorship, cocoon formation and settlement of embryos at two elevated suspended solid concentrations.

Mucous cocoons offer protection in some marine organisms. Coral embryo (left), parrot fish (right).

Photo credits: Mikaela Nordburg (offshore sediment cocoon, ripped cocoon and settlers) and NOAA Images (parrotfish).