

BIVALVE OOCYTE INVIABILITY REVEALED USING A SIMPLE STAINING TECHNIQUE

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Study Description

Building on recent work which showed high levels of atresic (degenerating) oocytes in the gonad of several marine bivalve species, we used the Neutral Red vital stain and the Trypan Blue mortal stain to determine what proportion of the spawned oocytes of the common cockle, *Cerastoderma edule* (Linnaeus, 1758), were non-viable. The large proportion of non-viable oocytes (35–85%) in this high-fecundity species evokes a Red Queen-type reproductive dilemma. Together with a likely Sweepstakes Reproductive Success outcome (due to the extreme variability of the mudflat environment), subsequent consequences include unproductive energy expenditure and small effective population size.

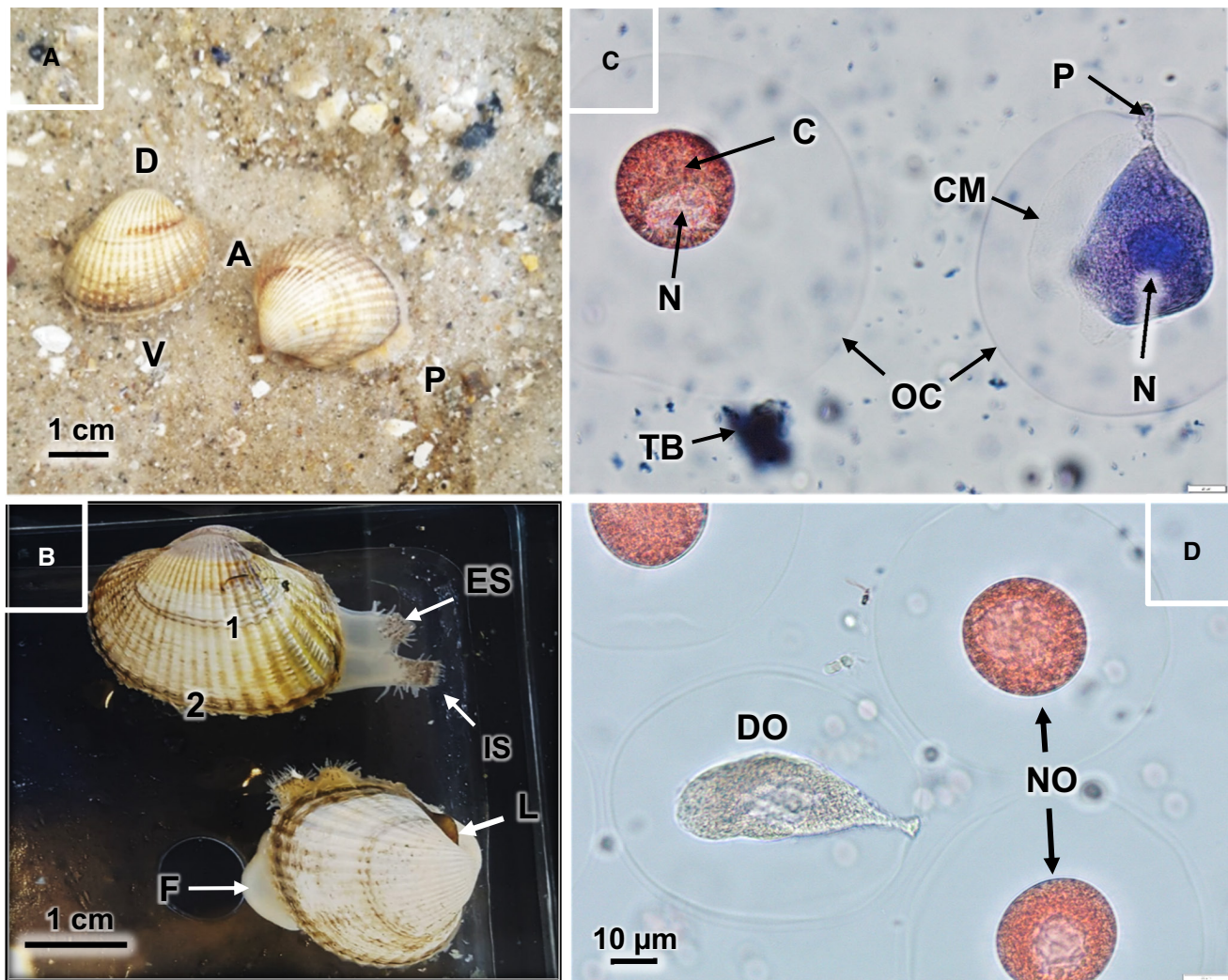


Photo 1. *Cerastoderma edule* (Linnaeus, 1758). (A) Emerged animals at low tide, (B) submerged animals with foot (F) and inhalant (IS) and exhalant (ES) siphons deployed. Animals in (A) and (B) are in their 3rd year (two annual growth rings are visible, corresponding to periostracal thickening) and thus both sexually mature. (C) Oocytes (OC) double-stained with Neutral Red vital stain and Trypan Blue mortal stain. Left, normal oocyte, right, dead oocyte. TB, undissolved Trypan Blue stain. (D) Oocytes stained with Neutral Red only; normal oocytes (NO) stain red, while dead oocytes do not stain. The TB stain proved effective, but cumbersome and costly to use in routine studies, while the more convenient and cost-efficient Neutral Red stain alone provided the same information. Photo credit: D. Chérel.

These photographs illustrate the article “Evolutionary and ecological insights from vital staining of bivalve oocytes: A Red Queen at the sweepstakes?” by Peter G. Beninger, Daphné Chérel, Gaël Le Pennec, and Sandra E. Shumway published in *Ecosphere*. <https://doi.org/10.1002/ecs2.4047>