

## First record of spawning in the mesophotic *Acropora tenella* in Okinawa, Japan

Rian PRASETIA, Frederic SINNIGER, and Saki HARIII\*

Sesoko Station, Tropical Biosphere Research Center, University of the Ryukyus, 3422 Sesoko, Motobu, Okinawa 905-0227, Japan

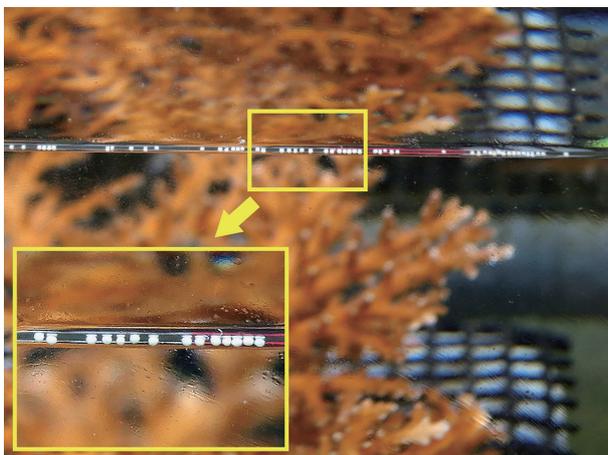
\* Corresponding author: Saki Harii

E-mail: sharii@lab.u-ryukyu.ac.jp

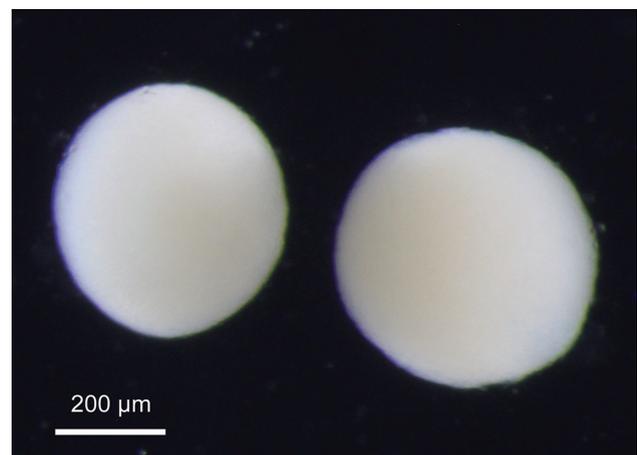
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Sexual reproduction of scleractinian corals has been documented for decades in shallow reefs (Baird et al. 2009), yet little is known from mesophotic coral ecosystems (MCEs, between 30 and 150 m depth) in the Pacific Ocean (but see Holstein et al. 2015, 2016 for the Caribbean Sea). *Acropora tenella* has been previously documented as one of the abundant species from an upper MCE (40 m depth) in northern Okinawa Island (Sinniger et al. 2013). Gametogenesis and fecundity of this species were described from specimens collected at the same location (Prasetia et al. 2016), but spawning was not observed. Here we report for the first time the spawning of *A. tenella* collected and maintained in open air running seawater aquaria. Running seawater was interrupted between 18:00 and 09:00. The colonies were monitored twice a day



**Fig. 1** Eggs of *A. tenella* were found floating at the surface in the aquarium. The picture focuses on the air-water interface showing the floating eggs with a colony of *A. tenella* in the background. Yellow rectangle shows an enlarged image of the floating eggs



**Fig. 2** Dissection microscope observation of *A. tenella* eggs

from 08:00 to 09:00 and from 18:00 to 22:00 from May 29<sup>th</sup> until 8 days after the main shallow *Acropora* spawning (May 31<sup>st</sup> 2015), then between 08:00 and 09:00 and between 18:00 and 19:00 until July 24<sup>th</sup> 2015. We observed that either 1 or 2 colonies of *A. tenella* released their gametes in one out of five outdoor aquaria (2 colonies per aquarium) at some point between 19:00 of June 19<sup>th</sup> and 09:00 of June 20<sup>th</sup> 2015. Whitish eggs were found floating at the surface with a mean geometric diameter of  $521.2 \pm 5.7 \mu\text{m}$  (mean  $\pm$  SE,  $n=11$ ) (Figs. 1, 2). The size and the absence of particular stress events at the time of the observation suggest that mature eggs were released although white or pale/cream mature oocytes are rare in *Acropora* (Baird et al. 2000). Although this observation is too limited to draw conclusion on the exact timing of spawning, it does fit with the previous study suggesting that this species spawns at a similar period (i.e. within weeks) to shallow *Acropora* spp. in the region (Prasetia et al. 2016). Moreover, the positive buoyancy of the eggs may suggest that fertilization happens on the surface. However, this would imply considerable challenges for fertilization, as the gametes of neighboring colonies will be dispersed during the slow ascent to the surface. In addition, since *A. tenella* is a mesophotic specialist (Veron 2000), the floating eggs also raise the question on how planulae can successfully swim down and find suitable habitat for settlement. Therefore, future research on the fertilization success and larval dispersal of this species is critical in order to understand the reproductive strategy of corals in the poorly understood deep reef habitats.

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