

Reproduction in the externally brooding sea anemone *Epiactis georgiana* in the Antarctic Peninsula and the Weddell Sea

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Introduction & Aims

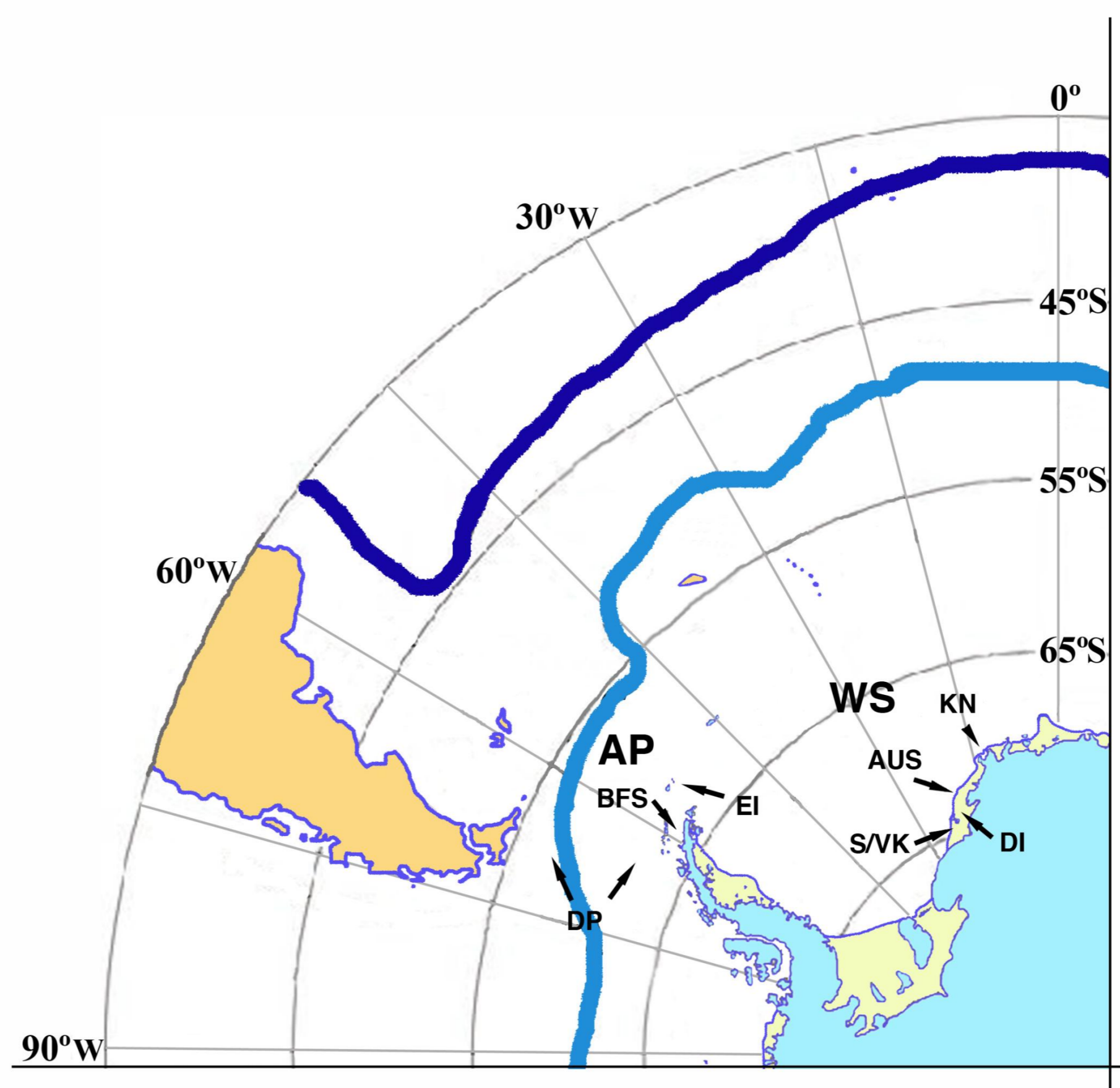
External parental care is uncommon among actinarians but common in species of the genus *Epiactis*. We study the reproductive biology of the Antarctic externally brooding sea anemone *Epiactis georgiana*. This is a medium-size actinarian (to 56 mm in diameter and 76 mm height), whitish in color, usually with a distinct marginal collar in which offspring are brooded.

Epiactis georgiana is circumpolar in the Antarctic and sub-Antarctic and inhabits soft and hard substrates in a wide bathymetric range (118–1,227 m depth), although it is especially abundant at 400–500 m depth.



Research area & Methods

Samples were collected in December, January, February, March, and April in several locations of the Antarctic Peninsula and the eastern Weddell Sea, during 1998, 2000, 2002, and 2003

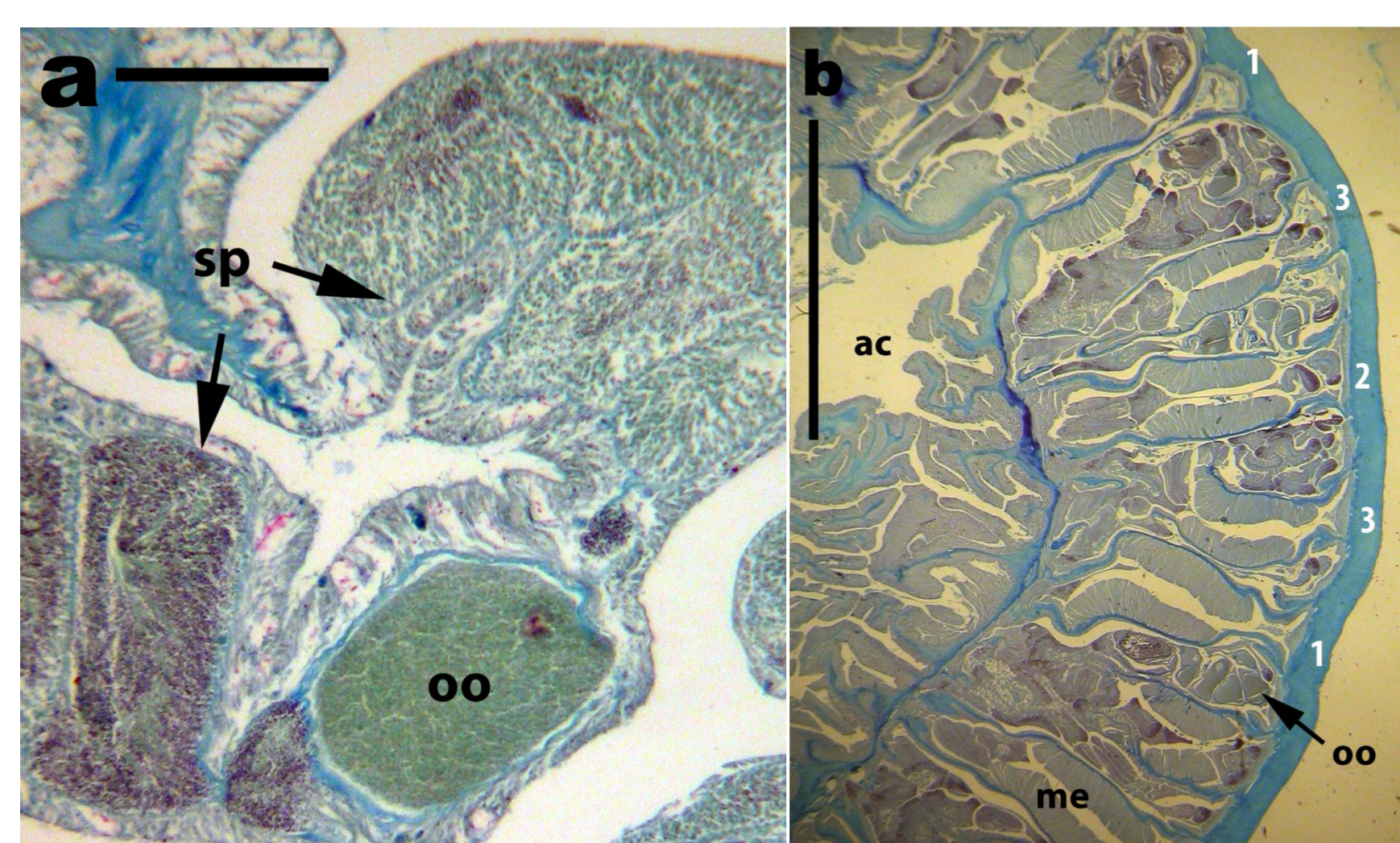


Specimens were examined to determine sex ratio and maturity classes. Sex ratio was calculated separately for each pooled area (65 specimens from AP, 40 from WS).

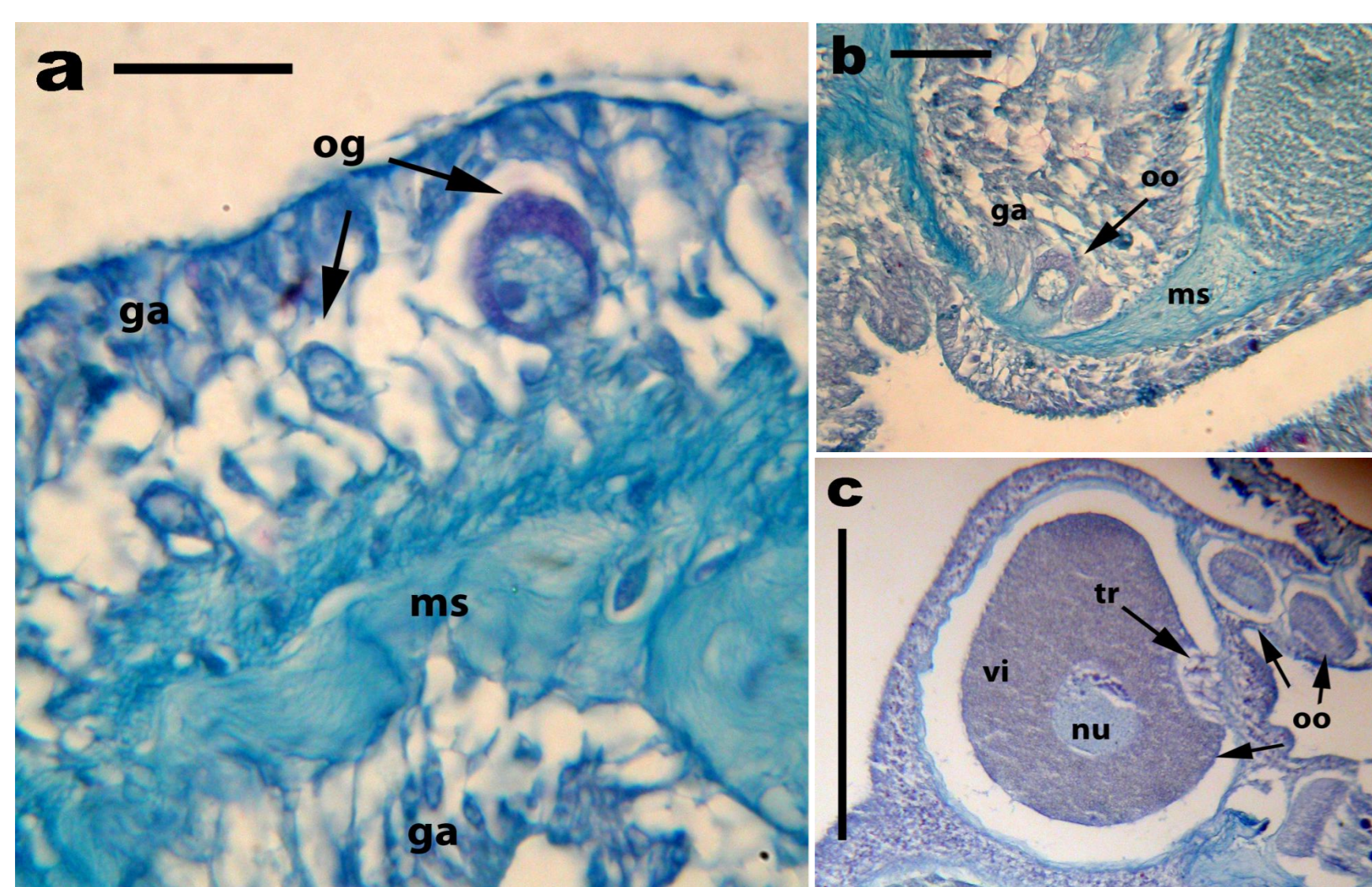
Fifty gametes were haphazardly selected from 30 female (16 from AP, 14 from WS) and 18 male (11 from AP, 7 from WS) specimens.

Results & Discussion

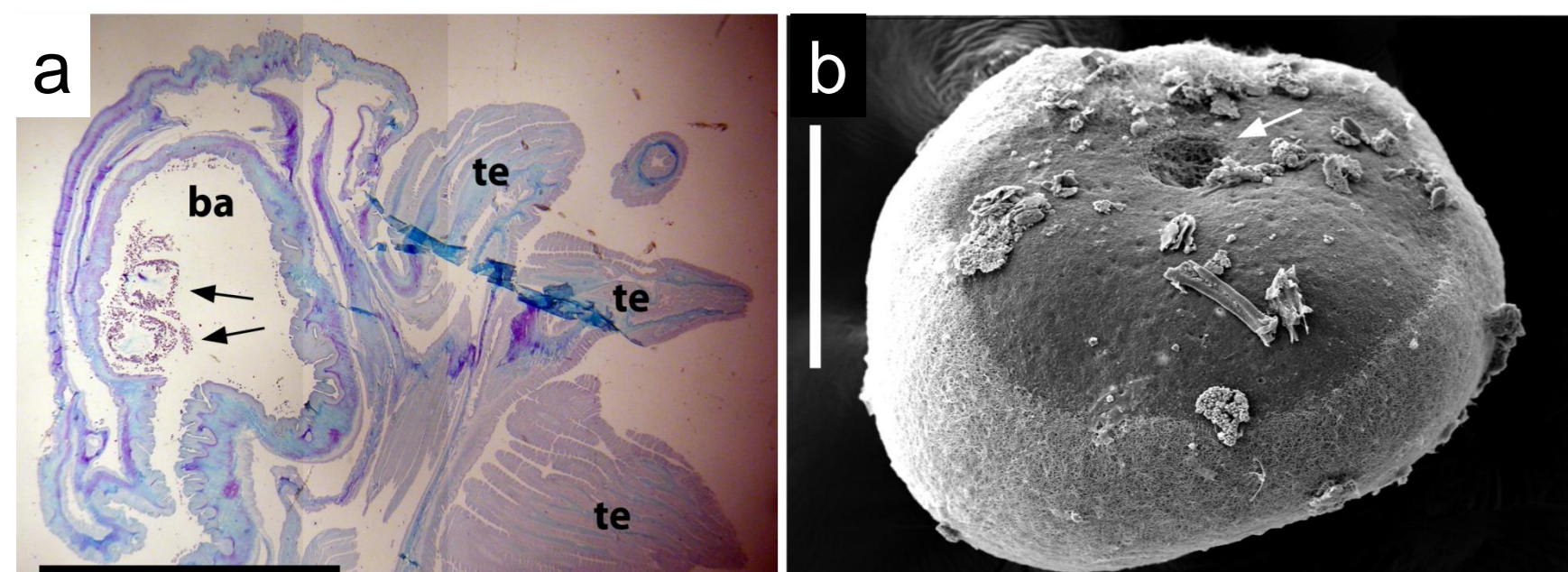
- The analysed specimens showed that most sexually mature individuals of *E. georgiana* are male or female, but some are hermaphrodites.
- Our results suggest that oogenesis starts in December and that at least two generations of oocytes overlap; a third generation is often brooded externally.
- Putative fertilization is likely internal, and larvae and/or embryos are externally brooded on the distal part of the adult column until an advanced developmental stage.
- Apparently *E. georgiana* reproduces seasonally, probably releasing the embryos/larvae in the last months of the austral spring (December).
- High inter-individual variability was observed in gametogenesis.



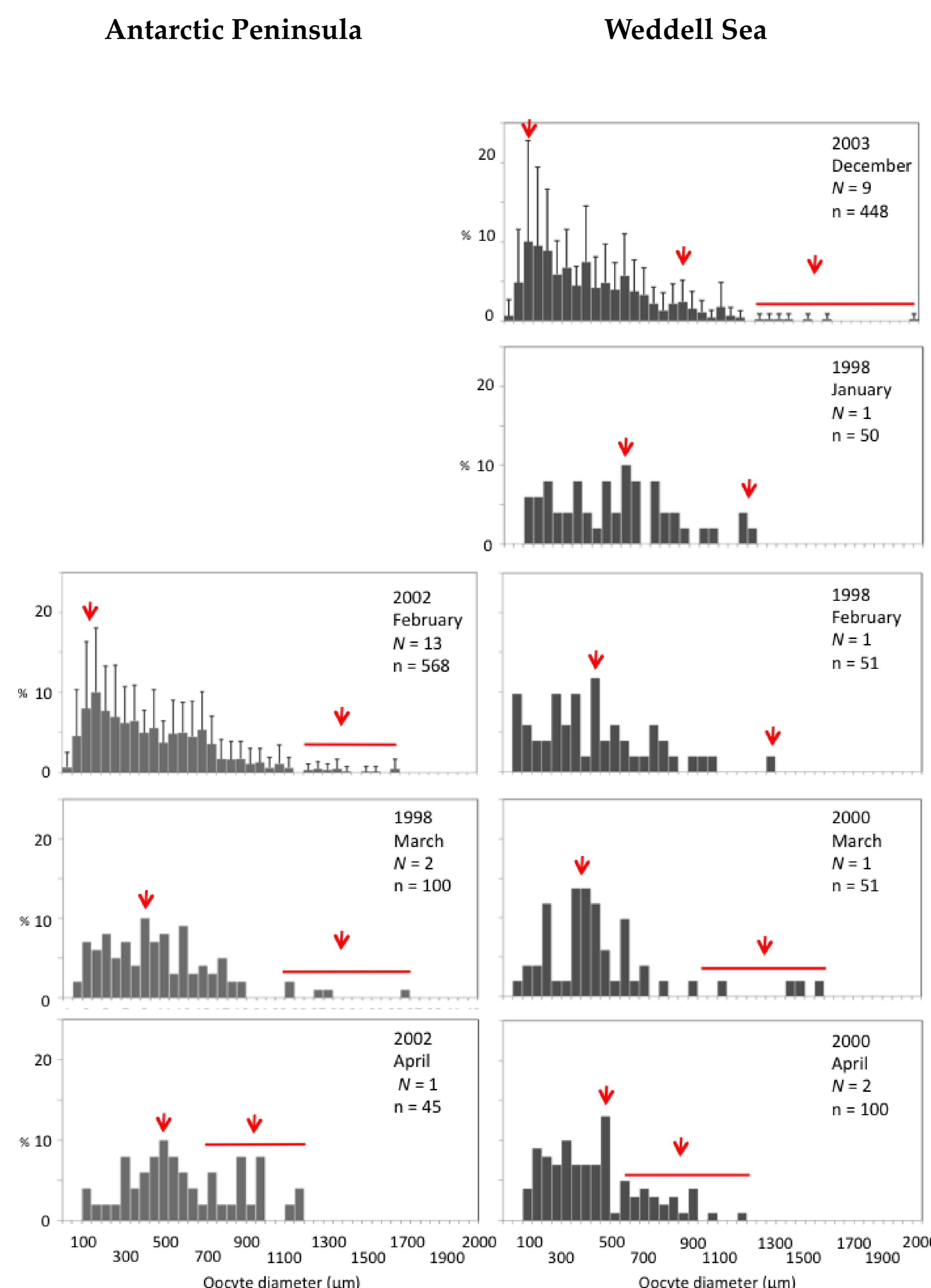
a detail of gametes in a mesentery of hermaphrodite specimen, b cross section at actinopharynx level showing cycles of mesenteries; numbers indicate pairs of mesenteries of different cycles. Abbreviations: ac actinopharynx, me mesenteries, oo oocyte, sp spermatid cyst. Scale bars a 0.3 mm; b 5 mm



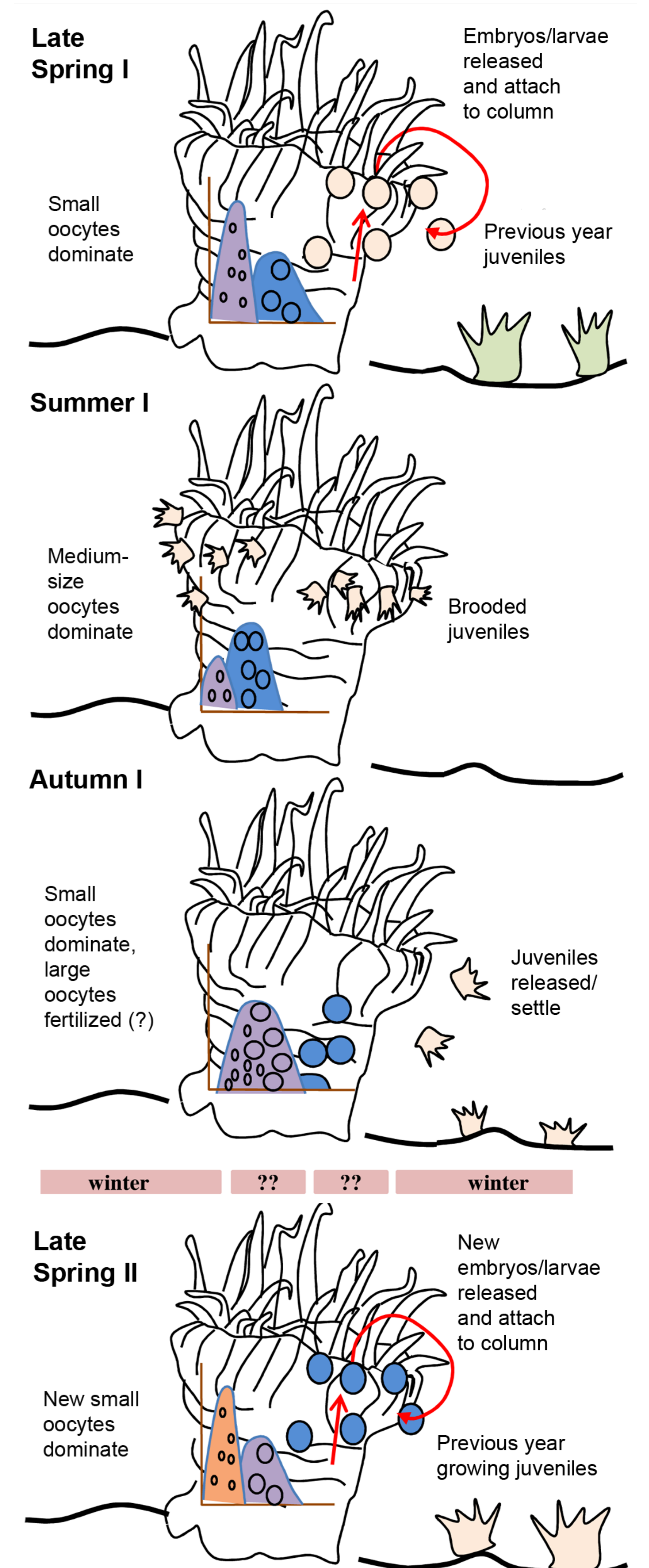
a first stage of development of female gametes: primary and secondary oogonia (8–10 μm and 30–35 μm in diameter, respectively) in gastrodermis with relatively large nucleus, b female cells (oocyte stage) migrated into mesoglea after reaching 30–45 μm diameter, c detail of two different sizes classes of oocyte (pre- and early vitellogenic oocytes); note trophonema. Abbreviations: ga gastrodermis, ms mesoglea, nu nucleus, og oogonia, oo oocyte, tr trophonema, vi vitelo. Scale bars a, b 30 μm; c 0.25 mm



a embryos in gastrula phase (arrows) externally brooded in distal part of column (longitudinal section), b embryos in advanced developmental stage with cilia forming toward blastopore area (white arrow). Abbreviations: ba brooding area, bl blastopore, te tentacle; Scale bars a 0.15 mm; b 20 mm; c 0.2 mm



Size frequency distribution (%) of oocytes separated by studied months, years, and zones (AP and WS). Arrows indicate suggested different oocyte maturity classes. N is number of females measured; n is number of oocytes measured



Schematic representation of hypothetical reproductive cycle of *E. georgiana*. A brooding female is represented through seasons of two consecutive years; each pattern (depicted by colors and circles) represents a different generation. Broken timeline and question marks represent missing data from winter; late spring (December); summer (January, February, and March); autumn (April).