

{rokbox title=|Different stages of gonad development in *P. nobilis* :: Image: Authors|
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S. Deudero, A. Grau, **M. Vázquez-Luis**, **E. Álvarez**, **C. Alomar**, I. E. Hendriks, 2017. [Reprod
uctive investment of the pen shell
Pinna nobilis
Linnaeus, 1758 in Cabrera National Park \(Spain\).](#)
Mediterranean Marine Science. 18/2. 2017. 271-284

Abstract: The spawning period can be a period of particular vulnerability for a species and in hermaphroditic species such as the longlived pen shell *Pinna nobilis*, different costs could be associated with female, male or hermaphrodite stages. Here gonad development in a population with few anthropogenic pressures is evaluated and the timing and succession of developmental stages, the sex ratio, and condition of the animals described. Resource mobilisation and associated costs are assessed through the relationship between stable isotopes and condition indices with reproductive parameters, and the role of the adductor muscle as a storage organ used in gonad maturation is evaluated. In our study area only one spawning season is observed, starting in May and peaking in June-July. The onset of spawning coincided with water temperatures of 20°C. Condition indices drop during the spawning period and recover afterwards to reach pre-spawning values in November. Stable isotope signals are negatively related to the gonad condition index, while the C:N ratio showed a positive correlation with the same index. Additionally, the muscle condition index sharply decreased after the start of the spawning season, which suggests that

P. nobilis

uses the reserves stored in the adductor muscle for reproduction, as recorded in other Pinnidae species. Reproductive indices and stable isotopes ratios indicate 'capital breeding' as reproductive strategy of the pen shell. Decreased muscle force could mean a higher vulnerability during the summer period, coinciding with the peak in recreational activities involving poaching and boat anchoring.

Keywords: Gonad Index, histology, histochemistry, *Pinna nobilis*, reproduction cost, reproductive cycle, stable isotopes, western Mediterranean