
Plasticity of maternal investment and larval development in the common prawn *Palaemon serratus* (PENNANT, 1777) in response to environmental variability

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Résumé

The common prawn, *Palaemon serratus*, is a European marine shrimp, an essential link in the food webs to which it belongs, and the target of professional artisanal and recreational fishing. Females live for 2 to 5 years and generally reproduce twice a year (winter and summer layings). After hatching, pelagic larvae develop through a succession of moults (or larval stages) and are known to have a high degree of developmental plasticity, enabling them to cope with environmental variations. In this work, we studied the plasticity of maternal investment and the plasticity of larval development in response to the environment (temperature, quality and quantity of prey, chemical contamination) and the phenotypic links between the different stages of development (embryonic, larval and then juvenile). It was first necessary to characterise the variability of maternal reproductive traits in this species, and to understand and describe the variability of the larval developmental pathways followed.

*Intervenant

P. serratus females trade off fecundity and biomass per egg seasonally, with a greater number of offspring having fewer energy resources in summer than in winter. Older females maximise their investment by transmitting even more resources to the eggs in winter (biomass and fatty acids), but not in summer. This is because, under winter conditions, embryonic development is longer and more energy-consuming. However, the larvae that hatch from eggs that have received more maternal energy are generally larger. To maximise their survival under unfavourable conditions (*e.g.*, temperature, food stress, chemical exposure), the larvae delay plastically their metamorphosis and growth by undergoing more larval moults. The larvae's resistance to these environmental stresses, as well as their ability to develop through an abbreviated developmental pathway under favourable conditions, increases with the quantity of energy reserves received at hatching, particularly during winter broods and for larvae from older females. The bioenergetics achieved during the embryonic and larval stages, in response to environmental conditions, then have effects on the phenotype of juveniles as well as on their fitness, although the study of these phenotypic links remains to be further investigated. The results of this work provide a better understanding of the life cycle of *P. serratus* and the plasticity of reproductive traits selected by seasonality in marine decapods.

Mots-Clés: *Palaemon serratus*, Larval ecology, Developmental plasticity, Per Offspring Investment, Environmental stresses