

Variable within-brood maternal provisioning in newly extruded embryos of *Homarus gammarus*

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Abstract Offspring quality of decapod crustaceans has been widely studied, with special emphasis on the sources of variability determining embryonic and larval quality. Nevertheless, maternal provisioning has commonly been overlooked as a potential source of offspring within-brood variability. In the present study, the existence of variable maternal provisioning was assessed through the analysis of the fatty acid (FA) profile of newly extruded embryos from different regions of the brooding chamber of *Homarus gammarus*. Significant differences in the FA profile of embryos sampled from different pleopods and sides of the brooding chamber were recorded. Significant deviations of

the overall mean of each surveyed female were also observed for essential FA, particularly 20:4n-6, 20:5n-3 and 22:6n-3. Lipid energy available to fuel embryogenesis also varied among embryos sampled from different regions of the brooding chamber. Results suggest variable female investment at oocyte production, which may be amplified during the incubation period of developing embryos by differential lipid catabolism. For the first time, maternal provisioning is evidenced as an additional source for within-brood variability in the FA profile of embryos.

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Introduction

The biochemical composition of marine decapod crustaceans during their embryonic development has been thoroughly investigated in the past (e.g. Morais et al. 2002; Rosa et al. 2003; Calado et al. 2005; Rosa et al. 2005, 2007). Its study has been crucial to understand reproductive effort and population ecology, namely for species targeted by commercial fisheries. While it is out of the scope of the present work to provide an extensive overview of the reproductive process in decapod crustaceans, it can be summarized as follows: (1) the reproductive process of decapods starts with vitellogenesis, where large amounts of yolk are deposited by females in developing oocytes that will increase in diameter during maturation (Talbot and Helluy 1995; Rosa et al. 2003, 2005); (2) oocyte maturation is known to display several stages and is considered a synchronous process (Abdu et al. 2000; Tsukimura 2001; Rotllant et al. 2005); (3) ovulation (the release of oocytes from the ovary) and spawning (the extrusion of oocytes through gonopores before eventual fertilization) follow oocyte maturation (Talbot and Helluy 1995); (4) embryogenesis begins after fertilization and takes place in the ventral region of the abdomen without further