

Evidence of Paternal Protein Provisioning During Male Pregnancy in the Seahorse, *Hippocampus Abdominalis*

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Abstract : Syngnathid fishes (seahorses, pipefishes, and seadragons) are unique because embryos develop on or in the male in a specialised brooding structure. Many seahorse species are endangered or vulnerable, while others are popular in the ornamental fish trade. Seahorses are capable of nutrient provisioning (patrotrophy) of lipids during pregnancy via their fully enclosed brood pouch. Protein is vital for gene regulation and tissue growth during embryogenesis. We tested the hypothesis that protein is paternally transported to developing embryos during pregnancy in the Australian Pot-bellied seahorse, *Hippocampus abdominalis*. We compared the dry masses and nitrogen content in recently fertilised H. abdominalis embryos and newborns. We calculated an updated patrotrophy index, 1.34, but without a significant difference in dry mass between the two developmental stages. There was, however, a significant increase in total protein content from recently fertilised embryos to neonates. This suggests paternal protein transport is essential for H. abdominalis embryogenesis because protein yolk reserves are depleted by embryonic metabolism, and supplementation is required. This study is the first to provide evidence for paternal protein transport during pregnancy in seahorses. It furthers our understanding of the paternal influence on embryonic development in male pregnancy and how a protein-deficient diet during pregnancy may limit the allocation of resources to embryos, reducing offspring fitness. This research contributes to a deeper understanding of the fundamental reproductive biology of seahorses, which can help improve conservation and farming production outcomes.

Keywords : brood pouch, embryonic provisioning, nitrogen, parentotrophy, paternal investment, reproduction

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