


SHORT COMMUNICATION

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# Substrate preference and settlement behaviour of the megalopa of the invasive crab *Percnon gibbesi* (Decapoda, Percnidae) in the Mediterranean Sea

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## Abstract

The transition from a planktonic to a benthic life is a critical phase in which sub-adults are particularly exposed to the risk of predation and dispersion into unsuitable habitats, and plays a crucial role in the distribution, structure and dynamics of marine populations. Settlement involves the selection of an adequate substrate that provides shelter and food during early life stages. *Percnon gibbesi* is an alien brachyuran crab that has invaded the Mediterranean, where it is preferentially associated to boulders covered with shallow algal turf. The mechanisms of substrate selection leading to the settlement of megalopae are still unknown in *P. gibbesi*, yet their knowledge may shed light on its high invasiveness. We examined the substrate preference and settlement behaviour of 36 megalopae of *P. gibbesi* using three natural substrates in an experimental mesocosm: gravel, cobbles and flat stones. Video recordings of 30-min trials were used to assess the substrate preference, measure the time to selection and observe the behaviour of the megalopae. Strong preference was given to hard and stable substrates i.e., cobbles and flat stones with interstices where to hide, which are also the most suitable as they provide shelter and food. Direct selection was the dominant behaviour followed by exploration and lastly by hesitation. The megalopae selected quickly the most suitable substrate to settle, likely enhancing their chances of survival. Our findings suggest that rapid settlement on a suitable substrate contributes to the success of the biological invasion of *P. gibbesi* along the Mediterranean coasts.

**Keywords:** Microhabitat, Larval stage, Brachyuran crabs, Light traps, Alien species

## Background

Settlement and recruitment of marine organisms are complex processes affected by many biotic (larval morphology, pelagic phase duration, behaviour, etc.) and abiotic (oceanographic features, habitat structure, etc.) factors that occur at different temporal and spatial scales [1]. Many marine benthic organisms have a planktonic larval phase as part of their reproductive and dispersal strategy [2] that may disperse over large areas before settling and recruiting in a suitable habitat [3]. The

transition from planktonic to benthic life (i.e., the settlement) is a critical step in the life cycle of benthic invertebrates that have a planktonic larva [4]. Two phases may be distinguished in this process: (1) a behavioural phase of search for a suitable substrate that provides shelter and food, and (2) a phase of permanent residence or attachment to the substrate, which triggers the metamorphosis [1]. The ability of recognizing a suitable substrate is therefore essential to enhance the survival chances of settlers and to guarantee the success of recruitment, and it ultimately determines distribution, structure and dynamics of animal populations.

Like most benthic marine organisms, brachyuran crabs have a pelagic larval phase followed by a benthic phase

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