Marine symbiotic association: may the host recognition be possible since the early stage of symbiont life?

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Symbioses are intimate and durable associations between at least two heterospecific organisms, commonly named the host and the symbiont. Many symbionts can be highly host dependent, and the chemical communication as, for example, the recognition between symbiotic organisms, is essential for the durability of many symbioses. In marine environments, host selection is considered multimodal but mostly relies on chemical communication. It is made possible by the secretion of secondary metabolites produced by the host, the so-called kairomones or synomones, that are recognized by the symbiont. Several studies already focused on the echinoderm host recognition performed by adult symbiotic crustaceans, but none of them has ever investigated if the crustacean larvae recruitment was mediated by chemical communication. In the lagoon of Moorea (French Polynesia), we decide to investigate Asteroidea - Crustacea association. Indeed, despite their strong chemical defenses, sea stars are known to shelter an important associated fauna, including obligatory ectocommensals crustaceans. We focused on the symbiosis between the sea star *Culcita noveaguineae* and its symbiotic shrimp *Zenopontonia soror*. The chemical attractiveness of the adult shrimps was first tested in a Davenport olfactometer and highlights an active attraction of the symbiotic adults to the chemical environment produced by the host. Indeed, 80% of the shrimps could actively swim towards the chemical cue produced by the host. For the first time, we also investigated the host recognition on the shrimp zoea larval stage thanks to a particular Y-tube choice device with a low water flow. Larvae could also recognize the host sea star as they strongly oriented themselves toward the host conditioned water. Therefore, we suggest that the pelagic *Z. soror* larvae are recruited by a specific chemical cue produced by their host *C. noveaguinea* in vivo, and, moreover, the host recognition may take place since the early state of the symbiont life.

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