

Anthraquinones produced by crinoids allow host selection for the symbiotic snapping shrimp *Synalpheus stimpsonii*

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ABSTRACT

Quinones are molecules produced by various organisms, including feather stars (Echinodermata, Crinoidea). Besides being one of the major pigment groups that provide their bright colors, they can also act as defensive molecules that make crinoids unpalatable and even repellent to most organisms. Conversely, these organisms are also known to shelter an important associated fauna, such as the ectocommensal snapping shrimp *Synalpheus stimpsonii*. Around the Great Reef of Toliara (Madagascar), *S. stimpsonii* can be found in association with two different species of crinoids: *Comanthus wahlbergii* and *Phanogenia distincta*. Our study investigated the chemical cues that allow host selection for this symbiont. The chemical attractiveness of the two crinoid hosts and a non-host species, *Cenometra bella*, was tested in an olfactometer. The three crinoids released cues in the ecosystem that were attractive for *S. stimpsonii*. Analyses of purified *P. distincta* extracts by mass spectrometry highlighted three kinds of anthraquinones (*i.e.* rhodoptilometrin, 3-propyl-1,6,8-trihydroxy-9,10-anthraquinone and a new crinoid anthraquinone). This mixture of anthraquinones seems specific to this species, as suggested by the current literature. Moreover, when tested in the olfactometer, these extracts induced a similar attractive behavior on the shrimp. Same results were also observed with an addition of pure commercial anthraquinones. Therefore, we suggest that crinoid anthraquinones are not confined to their traditional defensive function, but also act as kairomones involved into the host selection in the symbiotic association between *S. stimpsonii* and *C. wahlbergii* or *P. distincta*.

Keywords: Marine chemical ecology; Kairomones; Feather stars; Olfactometry