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Impact of host separation on the echinoderms obligate symbionts

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Symbioses refer to long-lasting associations between different species, typically a host and a symbiont. Some symbionts have evolved to become highly dependent on their hosts, developing various adaptations to maintain this relationship. Recent research has revealed a new type of dependency in which symbionts rely on the chemical environment produced by their host (Brasseur *et al.*, 2018). This dependency can lead to a condition called "host separation syndrome," in which symbionts experience changes in health and coloration, and potentially death, when isolated from their host. This syndrome was studied on *Echinometra mathaei* and two of its symbionts (*Arete indicus* and *Tuleariocaris holthuisi*). In addition, we investigate this phenomenon in two other decapods-echinoderm associations: (i) the sea star *Culcita noveaguineae* and the sea star shrimp *Zenopontonia soror*, and (ii) the crinoid *Phanogenia distincta* and the pistol shrimp *Synalpheus stimpsonii*. We tested three different conditions, namely (i) the symbionts remaining on their host (control), (ii) the symbionts being isolated from their host, and (iii) the symbionts being isolated in water containing semiochemicals produced by their host. Our results indicate that all the symbionts experienced the separation syndrome, but only *Synalpheus stimpsonii* and *Tuleariocaris holthuisi* showed chemical dependency on their respective host. Additionally, our findings suggest that the phenomenon of symbiont discoloration is more complex than previously described. Overall, our study sheds light on the importance of chemical dependency in symbiotic relationships and provides further insights into the host separation syndrome.

Reference

Brasseur, L. *et al.* (2018) *Echinometra mathaei* and its ectocommensal shrimps: the role of sea urchin spinochrome pigments in the symbiotic association, *Scientific Reports*, **8**(1), 1–10.