Can reef-building corals face environmental changes through trophic plasticity?

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Most reef-building corals can derive nutrition either autotrophically or heterotrophically, which allows them to exploit diverse trophic pathways. When facing environmental changes, therefore, these organisms are expected to demonstrate an intrinsic ability to acclimatise through trophic plasticity. Despite the ecological importance of these corals, however, our understanding of their trophic plasticity is currently impaired by a lack of rigorous research approaches; a failure to consider the intraspecific variability of coral species and an oversimplification of the proxies for determining heterotrophic habits (e.g. corallite diameter). In order to understand how trophic plasticity may allow reef-building corals to acclimatise, this study aimed to assess the trophic plasticity of four morphologically contrasted coral species (i.e. *Stylophora pistillata*, *Porites lutea*, *Isopora palifera* and *Psammocora profundacella*). We determined the stable isotope ratios of carbon and nitrogen in the corals' host tissues and algal symbionts and compared them in corals inhabiting areas around Taiwan that are characterised by contrasting temperatures (from high to low latitudes) and light levels (from shallow to mesophotic waters). In these areas, we evaluated interspecific and intraspecific trophic variability by estimating and comparing coral isotopic niches as a proxy for trophic niches. Our results suggest a variable degree of trophic plasticity in reef-building coral species. Trophic plasticity was important for *P. lutea* and *P. profundacella*, while it was lower for *I. palifera* and *S. pistillata*. Although trophic plasticity was low for the latter species, the results revealed no overlap of the isotopic niches for the host and symbiont from different locations, suggesting that these coral colonies are supported by different core resources. Moreover, the isotopic niche of higher-latitude coral colonies was larger than that of lower-latitude coral colonies, highlighting a certain trophic plasticity that may be related to the more variable environmental conditions in the higher latitudes. Analyses of additional species and locations will provide essential insights into the trophic plasticity of reef-building corals and how these species might adjust their nutrition in response to global environmental changes.

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