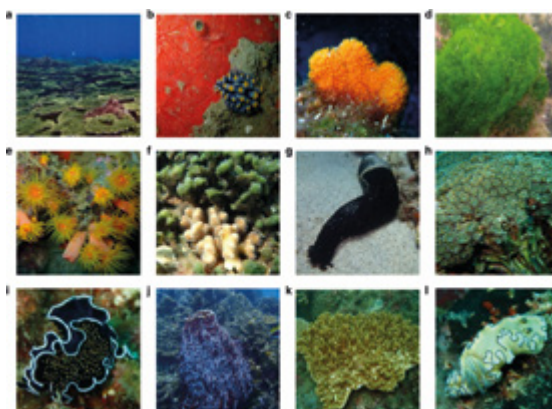


# The sponge microbiome within the greater coral reef microbial metacommunity

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One of the most recent and fascinating developments in biology has been the realisation of how important microbiomes are to the healthy functioning of organisms and entire ecosystems. In marine environments, sponges have been considered a model organism to study host-microbiome relationships. Sponges are the most ancient of metazoans and are considered a reservoir of microbial diversity in the world's oceans. However, until now, it was not clear if and to what extent microorganisms found in sponges are also present in other coral reef biotopes.

The research team of the Laboratory for Molecular Studies of Marine Environments (LEMAM), from CESAM/Dbio, in collaboration with researchers from different institutions in Taiwan, Thailand and the Netherlands, carried out an extensive and ambitious study that aimed to characterise the microbiome of more than 200 coral reef samples from multiple taxa in the Indo-Pacific region. Using high-throughput DNA sequencing and the computer cluster from the University of Aveiro (Argus), the microbiomes from algae, chitons, stony corals, sea cucumbers, sponge denizens, flatworms, nudibranchs, soft corals, sponges, sea urchins, seawater and sediment were analysed. The researchers found that a high number of microorganisms are shared among different biotopes, supporting the hypothesis of Baas Becking that “everything is everywhere but the environment selects”. Contrary to what was believed until now, sponges are not the main contributors to total prokaryote diversity in coral reefs. They are only one, albeit an interesting, component of a much larger coral reef metacommunity.



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## FIGURE 1

Pictures of sampling sites and organisms sampled during this study. a. Coral reef in the southern Penghu islands, Taiwan, b. the nudibranch *Phyllidia* cf. *coelestis*, c. the sponge *Ptilocaulis spiculifer*, d. the green alga *Chlorodesmis fastigiata* in shallow water, e. the sun coral *Tubastraea coccinea*, f. the green sponge *Haliclona cymaeformis*, g. the sea cucumber *Holothuria leucospilota*, h. the stony coral *Galaxea astreata*, i. the spotted flatworm *Thysanozoon nigropapillosum*, j. the barrel sponge *Xestospongia testudinaria* covered by sea cucumbers (*Synaptula* sp.), k. the soft coral *Cladiella* sp. and l. the nudibranch *Doriprismatica atromarginata*. All photographs were taken by D.F.R. Cleary or N.J. de Voogd

## FIGURE 2

Diving in Taiwan.