

# Diversity of bacteria associated with the Carnivorous Sponge *Asbestopluma hypogea*

Samuel DUPONT<sup>1</sup>, Alyssa CARRE-MLOUKA<sup>1</sup>, Yan-yan LI<sup>1</sup>, Jean VACELET<sup>2</sup>,

Marie-Lise BOURGUET-KONDRACKI<sup>1</sup>

<sup>1</sup> Laboratoire Molécules de Communication et Adaptation des Micro-organismes, UMR 7245 CNRS, Muséum National d'Histoire Naturelle, 57 rue Cuvier (C.P. 54), 75005 Paris, France.

<sup>2</sup> Centre d'Océanologie de Marseille, Aix-Marseille Université, CNRS UMR 6540 DIMAR, Station Marine d'Endoume, Rue de la Batterie des Lions, 13007 Marseille, France

Corresponding author: Samuel Dupont, [sdupont@mnhn.fr](mailto:sdupont@mnhn.fr)

**Keywords** : *Asbestopluma hypogea*, carnivorous sponge, bacteria, microscopy

Marine sponges of the genus *Asbestopluma* are carnivorous sponges originally found in deep sea waters. The first discovery of the species *Asbestopluma hypogea* in 1996 (Vacelet *et al*, 1996) in a littoral cave (20 meters depth) off the Mediterranean coast, France, gave the great opportunity to study this rare species, which can be easily raised in an aquarium. Microscopic studies revealed that this tiny carnivorous sponge, which has no digestive tract, harbors numerous bacterial strains in its mesohyl. Aiming to obtain further insights into the role of these associated bacteria within the sponge host, we have investigated the microbial community associated with *A. hypogea* combining microscopic, cultural, metagenomic and chemical approaches.

Preliminary microscopic observations had revealed the presence of bacteria and archaea in *A. hypogea* tissues. Further studies (MET) showed the presence of bacteriocytes in the mesohyl of the sponge containing two morphotypes (rod shaped, coccoid). Culture-dependant and culture independent approaches were developed in order to estimate the cultivable and the total microbial flora of *A. hypogea*, respectively. Fifty seven bacterial strains were isolated and identified using the 16S gene sequences. These sponge associated bacteria can be affiliated to three bacterial groups: *Proteobacteria*, *Firmicutes*, and *Flavobacteriaceae*. Fluorescence *in situ* hybridization studies are in progress to allow the localization of bacteria isolates in the sponges cells.

Evaluation of the role of these bacteria in nutrition or as modulators of microbial associations was investigated through antioxidant, antimicrobial and chitinase assays. Bacterial strains *Paracoccus* sp. S2, *Streptomyces* sp. ASB1 and *Joostella* sp. ASB7 are of particular interest since they revealed significant activities in the three assays.

Further chemical investigations are underway to identify the molecule(s) responsible for these activities and to determine their contribution to the associations.