SORBONNE UNIVERSITÉ

Interfaces pour le vivant

Title of the research project: **chemical sensing and intra- & inter-species communication during parasitic attacks (DINOSENS)**

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Subject description:

Pathogens, such as predator and parasite, increase their fitness by becoming more selective and efficient in finding their prey and host. In response, prey and host have evolved complex behavioral, morphological and chemical mechanisms that render them more resistant to these attacks. A key point for the two partners is to sense the presence of the other, well before the physical encounter, and develop the appropriate response either to attack or to resist. During this PhD project, we will study the potentiality for inter- and intra-species communications via chemical cues in marine dinoflagellates during parasitic attacks. Dinoflagellates (Alveolata) are important unicellular primary producers spread among the world's oceans, some of which being responsible for toxic blooms. Their biology is still enigmatic, dinoflagellates having the largest gene-rich genomes (up to 250 Gb) within eukaryotes, permanently packed into condensed chromosomes. Among their pathogens, the eukaryotic parasite Amoebophrya was observed to be highly virulent and generally hostspecific. They are considered as important drivers of dinoflagellate bloom successions in the field, even for toxic species. We are particularly interested in exploring whether freshly chemical cues emitted by infected dinoflagellates will modify the physiology and the behavior of healthy congeners having different degrees of resistance. The gene expression of dinoflagellates being suspected to be constitutive in dinoflagellates, we will explore their potentiality for chemical sensing at the molecular level, by analyzing their metabolome. This thesis is thus situated at the interface of two classically separated domains in biology; ecology and chemistry. Challenge of the thesis is also methodological, as we want to adapt these techniques to work at a single cell level. By resolving this sticking point, we will open new avenue to work directly on natural samples, especially on still uncultivable organisms.