15. Algae and Signalling - regulation of processes from cell to globe

15PO.1

CHEMICAL SIGNALING AND DEFENSE IN BROWN ALGAL KELPS DURING INTERACTIONS WITH HERBIVORES

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In the terrestrial environment, volatile organic compounds including aldehydes are emitted during defense responses by plants and perceived by neighboring plants as warning distance signals, leading to priming and systemic defense against herbivores. In the marine environment, a distance signaling exists in response to grazing in some brown algae, as well as regulation of transcription and metabolic pathways. We have recently shown systemic responses in the brown alga *Laminaria digitata* upon defense elicitation and demonstrated a priming effect, induced by chemical cues present in seawater surrounding a kelp bed and/or released from neighboring brown algae. Such distant chemical signaling should have a major ecological role in structuring marine algal communities. However, the chemical nature of these compounds remains unknown and the biochemical mechanisms leading to their production are also unexplored. In the context of kelp/herbivore interactions, we are developing metabolomic approaches to study the defense and signaling responses upon herbivory in two brown algal species from kelp belts, *Laminaria digitata* from North-Alantic Brittany and *Lessonia spicata* from Chilean coasts. Simultaneously, bioassays using the limpets *Scurria scurra* for *L. spicata* and *Patella pellucida* for *L. digitata* are used for determining the effects of chemical signals on algal consumption by grazers. The results displayed an increased consumption of kelps elicited by oligoguluronates (endogenous elicitor of Laminariales), as well as those which are co-incubated in the same seawater environment, revealing a chemical communication between algae. Indeed, metabolomic approaches highlighted that a wide range of chemical compounds are emitted in seawater in the first hours after elicitation. Targeted approaches also showed that some aldehydes could be involved in this communication, as priming inducers.

15PO.2

STRUCTURE ELUCIDATION OF LIPIDS SIGNALS FROM ZOOPLANKTON ORGANISMS

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The first signaling compounds between marine zooplankton and phytoplankton was recently discovered and structurally determined. The signal compounds consist of eight novel polar lipids that induce defense responses in algae and the response is highly species specific. Some phytoplankton responds strongly to some copepods and not to others. The reason for this appears to lie in the composition of the copepodamide cocktail each copepod species exude. Some copepods are stronger inducers because they predominantly exude the more potent copeodamides A-C whereas others are weaker and dominated by less potent copepodamides. Here we screen a number of calanoid copepods for their copepodamide composition. In addition we detect additional structurally closely related lipids, and present the structure of an additional copepodamide, extracted and isolated from *Calanus finmarchicus* from the North East Atlantic.