Chemical signals from microalgae that shape communities and structure the marine environment

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Unicellular algae have established efficient means to interact with other organisms in their environment. Especially chemical signals play an important role in this context. Algal exudates as well as intracellular metabolites can, for instance, influence feeding activity of herbivores and algal / algal interactions. But also communication of algae with the surrounding microbial community is mediated by such chemical signals. Knowledge about the nature of these signal molecules opens up possibilities to investigate their mode of action, the regulation of interactions, and even to manipulate communities. This talk highlights that efficient chemical signaling is often a highly dynamic process that can be switched on and off upon demand. Indeed, surveys based on elaborate mass spectrometric methods confirm that algae exhibit a high plasticity of metabolite production during their development and in interaction situations. This regulation opens up new avenues for the identification of signals and mechanisms of chemically mediated interactions. Using a combination of comparative metabolomics and ecological investigations even dilute signal molecules can be elucidated. In addition, microscopic gradients of metabolites are visualized and mimicked to illustrate how chemical information can structure the otherwise homogeneous aqueous environment of microbes. Overall this talk will introduce novel concepts in marine chemical ecology.