Editorial

Chemical ecology aims to understand the impact of natural chemicals on ecological processes. By combining natural products chemistry and ecology, often in creative and surprising ways, chemical ecologists unravel the mechanisms that govern interactions between different organisms. From pheromones to plant toxins, ecological interactions are governed by the exchange of small molecular weight organic compounds. Identifying such molecules along with their biological and ecological effects has proven to be a powerful approach to understand the world around us, to find new ways towards sustainable agriculture and develop new approaches to manage environmental and human health.

Over the last decades, Switzerland has become a stronghold of world class research in chemical ecology. The Swiss chemical ecology community is rapidly growing and gaining momentum. I am thrilled to be part of this fantastic group, and hope that you will enjoy reading about some of its exploits in this special issue of CHIMIA!

A fascinating topic in Chemical Ecology is how biological control agents use plant volatiles to locate agricultural pests. ***Turlings and Degen*** provide an overview of this topic together with a number of other fascinating effects of plant volatiles on the environment. ***Schuman and coworkers*** discuss how plant volatiles can be leveraged for sustainable pest control by using plants that attract biocontrol agents and guide pests away. Pest attack often starts with an innocent looking insect egg. ***Reymond*** highlights the different plant- and insect-derived chemicals that determine where eggs are laid and whether they are fended off successfully.

Plants release large amounts of chemicals into the soil, which leads to important changes in the behavior and composition of soil organisms. ***Rasmann and Hiltpold*** discuss approaches to analyze root exudates and understand their biological impact and, ultimately, their importance for sustainable agriculture and global change. Benzoxazinoids are among the most abundant specialized metabolites that are produced and released into the rhizosphere by cereals. ***Robert and Mateo*** review the biosynthesis, structural diversity and agroecological functions of these compounds.

Concepts of chemical ecology can be applied to a wide variety of species interactions. ***Weisskopf*** discusses how microbial volatiles can reprogram other microbes and plant defenses and how they may be used to replace synthetic pesticides. ***Machado and von Reuss*** discuss the chemical ecology of free living and entomopathogenic nematodes, a fascinating but often underestimated group of animals whose behavior is governed largely by small molecular weight compounds.

Advances in chemical ecology often require methodological advances in analytical chemistry. Metabolomics has proven invaluable to our understanding of chemical patterns that govern ecological interactions. ***Wolfender et al.*** discuss how metabolomics can be leveraged to discover bioactive molecules from complex mixtures, towards rapid discovery and application in chemical ecology and beyond.

The articles in this issue provide only a glimpse of the research in chemical ecology conducted in Switzerland. Many other researchers work in this discipline, spanning everything from plant-pollinator interactions to human parasite biology. The chemical ecology community is, in its very core, open to all fields of research and seeks to connect itself with scientists at all levels of scientific inquiry, from single molecules to ecosystems. I hope that this special issue will inspire you and help you identify new opportunities for interdisciplinary collaborations.

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The CHIMIA Editorial Board is very grateful to Prof. Erb for organizing this excellent set of articles from the strong chemical ecology community in Switzerland and introducing a fascinating subject that may not be directly on the radar of many chemical scientists.

Cover image: A *Tyria jacobaeae caterpillar* feeding on ragwort, *Jacobaea vulgaris.* Photo credit: Thomas Degen, University of Neuchâtel.

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