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Conference Report

Syposium on Chemical Ecology 2026

Past, Present, and Future of Chemical Ecology

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The *Chemical Ecology Network* is one of the newest working groups within the Swiss Chemical Society. Under the leadership of the board members Prof. Christelle Robert, Prof. Sergio Rasmann, Dr. Ivan Hiltpold, and Dr. Claudio Screpanti, the network organized the first *Swiss Chemical Ecology Symposium*.

The event was conceived to highlight and celebrate the distinguished achievements that have shaped the field of Chemical Ecology in Switzerland. In particular, the symposium was a tribute paid to ***Prof. Ted Turlings***, honouring his outstanding scientific career and his foundational contributions to the broad field of Chemical Ecology. The symposium emphasized the importance of strengthening this Swiss scientific community, recognizing past successes, and jointly reflecting on future directions. More than 100 participants from across Switzerland and abroad took part in the meeting, making this inaugural edition a clear success and highlighting the strong momentum of the chemical ecology community (Fig. 1).

The 17 talks and 15 posters covered the breadth and interdisciplinarity of contemporary chemical ecology, bringing together expertise ranging from molecular biology to evolutionary ecology and human health, thus offering a representative cross-section of current research in the field and stimulating lively discussions (Fig. 2). The detailed program of the event can be found at https://chemeco26.scg.ch/program and https://chemeco26.scg.ch/component/phocadownload/category/4-website-docs?download=30

1. Opening

The meeting was opened by David Spichiger, Executive Director of the SCS, who welcomed participants on behalf of the Society. He recalled that the integration of chemical ecology into the SCS was initiated about seven years ago under then President Alain De Mesmaeker. In the SCS anniversary year, this vision culminated in the first dedicated *Chemical Ecology Symposium*, fostering exchange within the community and celebrating Prof. Turlings' contributions.

2. Laudatio for Ted Turlings

The laudatio for Prof. Ted Turlings (University of Neuchâtel) was delivered by ***Prof. Matthias Erb*** (University of Bern), a former PhD student and long-standing colleague. In his address, he retraced 'The Life of Ted Turlings' within the broader development of chemical ecology in Switzerland, underscoring the decisive role Turlings played in shaping the discipline nationally and internationally. Beyond his scientific achievements, the tribute highlighted Turlings' distinctive mentorship style, demanding yet empowering, visionary yet playful, exemplified by the creation of the FARCE group and his sustained support of early-career researchers. Although officially retired, his trajectory clearly signals not an endpoint but a new phase. Recipient of the Marcel Benoist Prize in 2023, he continues to expand his scientific influence through ongoing projects and international appointments, including affiliations in China and the United States.

In a personal and warm intervention, his wife ***Dr. Betty Benrey*** offered further insight into Turlings' character, emphasizing his relentless curiosity, where even a simple walk becomes an exploration, and the close intertwining of scientific and family life. Her remarks reflected a long-standing partnership balancing research, fieldwork, and family commitments.

3. Ted Turlings' Keynote Lecture

In his lecture which he retitled 'In pursuit of my own incompetence', ***Prof. Turlings*** reflected openly about his shortcomings and early academic struggles before finding his path at Leiden University, followed by his move in 1985 to Jim Tumlinson's laboratory in Florida. There, building on pioneering pheromone research, he demonstrated that herbivore-induced plant volatiles guide parasitoids to their hosts and contributed

Fig.1. Group picture of the participants. Credits: Pilar Junier and Ivan Hiltpold.

to the identification of volicitin, an insect-derived elicitor of plant defences. After positions in Zurich and ultimately Neuchâtel, he emphasized lessons learned along the way: the importance of intellectual independence, careful recruitment of coworkers, and convincing oneself before convincing others. He acknowledged key collaborators, including Eric Schmelz for the discovery of inceptin and its receptor, and highlighted ongoing work linking elicitor-induced volatiles to ecological function under field conditions. Recent advances include real-time plant volatile detection using PTR-ToF-MS to diagnose herbivore damage, as well as applied projects exploring entomopathogenic nematodes and novel gel formulations to control fall armyworm in collaboration with international partners.

The lecture concluded with reflections on mentorship, group achievements, and gratitude to his family and collaborators, underscoring once more that his scientific journey is far from concluded.

4. Scientific Sessions

4.1 *Session 1 – Plant-Herbivore Interactions*

Chaired by Prof. Christelle Robert (University of Bern), the session focused on mechanistic and ecological dimensions of trophic interactions. ***Prof. Em. Ted Farmer*** (University of Lausanne) reported the role of the xylem in systemic defence signalling during herbivory. Using electrophysiological recordings and mutant analyses in Arabidopsis, his work demonstrated that vein damage triggers massive electrical depolarisations and fluid movement, and that myrosinases (TGG1/2/3) and aliphatic glucosinolates emerge as key components in long-distance defence activation.[1]

Baptiste Bovay (University of Neuchâtel) addressed how trophic interactions shift under different climatic conditions along an elevation gradient. Using common garden experiments, he showed that herbivory and predation outcomes are temperature-dependent and ultimately also can cascade down to even affect organic matter decomposition.

Dr. Mitchel Bourne explored how hyperparasitoids exploit plant signalling to locate concealed parasitoid hosts within aphids. He demonstrated that parasitized aphids modify plant defence responses and volatile emissions in a host-specific manner, revealing that parasitism reshapes plant signalling networks.[2]

4.2 *Session 2 - Molecular Mechanisms*

The second session was chaired by Prof. Matthias Erb (University of Bern) and focused on molecular and physiological mechanisms underlying plant perception and response to biotic chemical cues. ***Prof. Philippe Reymond*** (University of Lausanne) presented new insights into how plants perceive insect eggs. Using a genome-wide association study in *Arabidopsis thaliana*, his group identified the calcium channel GLR2.7 as a key regulator of egg-induced immune responses. Egg-associated glutamate and glutathione activate GLR2.7, revealing a link between egg-derived phospholipids and early immune signalling.[3]

Dr. Hao Yu (University of Bern) challenged the prevailing view that volatile organic compounds are perceived exclusively through open stomata. Using the CAM plant *Kalanchoë laxiflora*, he investigated the existence of a non-stomatal uptake pathway that may enable plants to perceive airborne signals and activate defences even when stomata are closed, revealing a previously unrecognized route of volatile sensing.

Marina Garcia-Alonso (University of Bern) introduced a field-compatible analytical platform combining PTR-ToF-MS with robotic sampling for spatially resolved real-time VOC profiling. Applied to maize, the system revealed a realistic view of volatile dynamics under open-air conditions, opening new avenues for studying plant signalling in ecological contexts.

Fig. 2. Participants networking during a break. Credits: Pilar Junier.

4.3 *Session 3 – Evolutionary Biology*

The third session, chaired by Prof. Sergio Rasmann (University of Neuchâtel) addressed evolutionary processes shaping chemical traits under biotic and abiotic selection pressures. ***Prof. Florian Schiestl*** (University of Zurich) presented experimental evolution studies demonstrating how pollinators and temperature jointly drive rapid changes in floral traits in fast-cycling *Brassica rapa*. The work shows that pollinator selection can mitigate some negative effects of temperature stress and highlights rapid evolutionary divergence under combined ecological pressures.

Dr. Emilio Guerrieri (Institute for Sustainable Plant Protection URT IPSP-DISIT) focused on below-ground plant-plant communication mediated by root exudates. Building on biological activity-guided fractionation bioassays, he demonstrated that aphid-induced L-DOPA release by broad bean roots triggers release in roots, in turn triggering defensive volatile emissions in neighbouring plants.[4–6] These findings expand the concept of chemically mediated plant communication to subterranean environments.

Dr. Quint Rusman (University of Zurich) experimentally tested the Geographic Mosaic Theory of Coevolution under warming conditions. Using plant-butterfly systems across multiple generations, he demonstrated that temperature and mutualist presence shape distinct coevolutionary trajectories. Plants evolved stronger herbivore resistance under either elevated temperature or pollinator presence alone, whereas their combination produced divergent outcomes, providing support for environment-dependent coevolutionary mosaics.

4.4 *Session 4 – Ecometabolomics*

The fourth session was chaired by Dr. Emmanuel Defossez (University of Neuchâtel) and highlighted how high-throughput metabolomics and predictive modelling can uncover ecological and evolutionary patterns in plant chemodiversity. ***Dr. Thomas Dussarrat*** (University of Bielefeld) showcased how ecological metabolomics combined with machine learning can predict environmental conditions from plant metabolic profiles. Multispecies analyses from extreme habitats such as the Atacama Desert revealed a core set of metabolites that reliably indicate abiotic stress, pointing to a shared metabolic toolkit across lineages.[7] In *Brassica rapa*, reduced pollinator availability decreased overall chemodiversity while maintaining defensive traits, illustrating how ecological pressures shape metabolic evolution.

Mazzarine Laboureau (University of Neuchâtel) investigated

the chemical signature of *Artemisia absinthium*, a key species in traditional Neuchâtel absinthe production. By comparing wild populations across elevation gradients with individuals cultivated in a common garden, the study revealed strong organ-specific metabolomic differentiation and a convergence of chemical profiles under cultivation. These findings highlight the relative roles of genetics and environment in shaping plant chemodiversity linked to cultural heritage products.

4.5 Session 5 – Agroecology

The final session was chaired by Dr. Ivan Hiltpold (Agroscope) and addressed chemically mediated interactions in applied agricultural systems and their implications for sustainable crop protection. ***Prof. Consuelo De Moraes*** (ETH Zurich) presented work on bumblebee leaf-damaging behaviour and its consequences for plant flowering and colony dynamics. Building on the landmark study by Pashalidou *et al*.[8] she discussed how pollen-deprived bumblebees actively damage plant leaves, accelerating flowering and thereby modifying plant phenology in response to pollinator demand. Ongoing research aims to elucidate the underlying mechanisms and assess the consequences of this behaviour for hive performance and plant–pollinator synchronization under environmental change.

Jasmine Cadena i Canals (Agroscope) examined cultivar-dependent interactions in the Flavescence dorée, *Scaphoideus titanus*, grapevine pathosystem. Although laboratory assays showed no intrinsic difference in pathogen susceptibility between *Vitis vinifera* cultivars Chasselas and Pinot noir, field data and vector performance assays revealed reduced leafhopper fitness and lower population densities on Chasselas. Hormonal and preliminary metabolomic analyses suggested cultivar-specific chemical profiles, pointing toward antibiosis-based effects on the vector as a driver of differential disease incidence.

Lea Bolis (University of Neuchâtel) addressed how intercropping oilseed rape with faba bean alters pest dynamics. Laboratory and field studies demonstrated that associative cropping modifies volatile emission profiles, disrupting host-location behaviour of major pests such as the cabbage stem flea beetle and the rape stem weevil. These chemically mediated effects provide mechanistic insight into how crop diversification can reduce pest pressure and support more sustainable agricultural systems.[9,10]

5. Closing Remarks and Outlook

In his concluding words on behalf of the organizing committee, Dr. Ivan Hiltpold reflected on the atmosphere that characterised the symposium: engaged discussions, spontaneous exchanges across career stages, and a palpable sense of shared purpose. The symposium demonstrated that chemical ecology in Switzerland is not only scientifically vibrant but also cohesive and internationally visible. By bringing together researchers from diverse institutions and backgrounds, the event fostered conversations and laid out groundwork for future collaborations. Importantly, it highlighted the value of maintaining a national platform that connects molecular work with ecological theory, applied agroecology with evolutionary biology, and fundamental discovery with societal relevance. The organizers expressed their intention to build on this foundation by further strengthening the Chemical Ecology Network within the Swiss Chemical Society, promoting early-career researchers, and enhancing international engagement. The strong participation and enthusiasm observed throughout the day suggest that this inaugural symposium marks the beginning of a sustainable and growing tradition. With continued collective effort, the Swiss Chemical Ecology community is well positioned to expand its scientific impact and contribute meaningfully to addressing environmental and societal challenges.

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