



## Otto Jaag Prize awarded twice for 2025

March 13, 2026 | Andri Bryner

Topics: Organisation & Staff | Biodiversity | Ecosystems | Pollutants

**Using isotope markers to break down food webs and track changes in them, as well as tracing the pathways and accumulation of pollutants in aquatic organisms – the Otto Jaag Water Protection Prize was awarded in 2025 for two exciting and highly topical doctoral theses.**

Thanks to an increase in the [Otto Jaag Water Protection Prize](#) by former Eawag Director Janet Hering, two prizes for outstanding doctoral theses were awarded in 2025. They went to environmental chemist Johannes Raths and evolutionary biologist Grégoire Saboret.

### Food chain reconstructed thanks to isotope analysis

Grégoire Saboret conducted his research at Eawag in Kastanienbaum under the supervision of Prof. Carsten Schubert (Surface Water Department). Under the joint supervision of Dr Jakob Brodersen and Dr Blake Matthews (Fish Ecology and Evolution Department), he further developed isotope analyses of amino acids and applied them specifically to fish. This enabled him to expand our understanding of food webs, as the markers provide information about primary producers (algae and bacteria) and all intermediate consumers on which they fed. Among other things, Saboret has shown how eutrophication of lakes affects production sources in the food webs of Swiss lakes and how the current melting of glaciers in Greenland is changing the diet of fish.

### Fish eyes with annual rings

Grégoire Saboret has received a mobility grant from the Swiss National Science Foundation and is currently at the University of California in Santa Cruz. However, he continues to conduct research and publish articles together with colleagues at Eawag. A publication is currently in preparation that



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cluding pollution and accelerating global climate change. Environmental contaminants are numerous and can form complex contamination patterns and mixtures in aquatic systems. The vast majority of organic contaminants originates from human use and enters aquatic environments from agricultural, industrial and household emissions. Pharmaceuticals and pesticides are contaminants of

particular concern as they are specifically designed to be biologically active and thus cause adverse effects on non-target organisms such as aquatic invertebrates. Aquatic invertebrates, including amphipods, provide important ecological functions such as detritus processing and transfer of energy to higher trophic levels that maintain the functionality and diversity of aquatic ecosystems. [...] (855 chars) serialnumber => protected" (0 chars) doi => protected'10.3929/ethz-b-000641995' (24 chars) uid => protected36402 (integer) \_localizedUid => protected36402 (integer) modified \_languageUid => protectedNULL \_versionedUid => protected36402 (integer) modified pid => protected124 (integer) 1 => Snowflake\Publications\Domain\Model\Publicationprototypepersistent entity (uid=36404, pid=124) originalId => protected36404 (integer) authors => protected'Saboret,&nbsp;G.' (16 chars) title => protected'Trophic dynamics in meta-ecosystems: insights from compound-specific stable isotopes' (84 chars) journal => protected" (0 chars) year => protected2024 (integer) volume => protected0 (integer) issue => protected" (0 chars) startpage => protected'197&nbsp;p' (10 chars) otherpage => protected" (0 chars) categories => protected" (0 chars) description => protected'Food webs are crucial for understanding how carbon and nutrients flow within ecosystems, influencing sustainability and carbon fluxes. Ecosystems are interconnected, exchanging energy, nutrients, and organic matter—a concept captured by meta-ecosystem theory. Consequently, changes in one ecosystem can have cascading effects on others. This interconnectedness becomes increasingly important as global change drives significant alterations in food webs. Therefore, there is a pressing need to characterize food web functioning in complex settings, such as meta-ecosystems, and to study how these webs are impacted by global change. [...] (639 chars) serialnumber => protected" (0 chars) doi => protected'10.3929/ethz-b-000699978' (24 chars) uid => protected36404 (integer) \_localizedUid => protected36404 (integer) modified \_languageUid => protectedNULL \_versionedUid => protected36404 (integer) modified pid => protected124 (integer) Rath, J. (2023) Bioaccumulation of polar organic contaminants in aquatic invertebrates: impact of climate, uptake pathways and spatial distribution, 288 p, [doi:10.3929/ethz-b-000641995](https://doi.org/10.3929/ethz-b-000641995), [Institutional Repository](#)

Saboret, G. (2024) Trophic dynamics in meta-ecosystems: insights from compound-specific stable isotopes, 197 p, [doi:10.3929/ethz-b-000699978](https://doi.org/10.3929/ethz-b-000699978), [Institutional Repository](#)

### Further original papers

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=> protected" (0 chars) categories => protected'arctic char; fjord; food web; glacier; Greenland; polyun

saturated fatty acid; trophic position' (114 chars) description => protected'The primary production of fjords across the Arctic and Subarctic is undergoi

ng significant transformations due to the climatically driven retreat of glaciers and ice sheets. However, the implications of these changes for upper trophic levels remain largely unknown. In this study, we employ both bulk and compound-specific stable isotope analyses to investigate how shifts at the base of fjord food webs impact the carbon and energy sources of consumers. Focusing on two rapidly changing fjords in Southern Greenland, we used the migratory Arctic char as an indicator species, sampling populations along environmental gradients within the fjords, building upon the assumption that char populations feed primarily close to their natal stream, thereby integrating a dietary gradient. Our analysis of bulk stable isotopes in Arctic char tissue confirmed this premise, revealing a consistent change in resource use from the outer to the inner fjord, which nonetheless served as preferred feeding grounds. Essential amino acid analysis further indicated shifts in carbon and nitrogen sources, consistent with changes in nutrient use near glacier inputs characterized by low turbidity and high iron levels. Notably, these changes in the source of primary production were associated with shifts in trophic positions and the transfer of polyunsaturated fatty acids, with Arctic char in glacier-influenced inner fjords feeding at lower trophic level (size-corrected) and accumulating higher levels of high-quality docosahexaenoic acid (DHA). These findings highlight the usefulness of new analytical tools in revealing that glacial retreat can substantially alter food web dynamics, enhancing both carbon flow and the nutritional quality of fish in fjord ecosystems. The two Southern Greenland fjords studied could represent the future of other fjords, where retreating glaciers become land-terminating and glacial inputs decrease. Our study underscores the critical role of glacier dynamics in affecting high...

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,&nbsp;C.&nbsp;J.; Gossner,&nbsp;M.&nbsp;M.; Ili?,&nbsp;M.' (135 chars) title => protected'Quantifying the utilisation of blue, green and brown resources by riparian p

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y acids; spiders; stable isotopes' (109 chars) description => protected'1. Global change drives multiple facets of biodiversity including interactio

n diversity, which is fundamental for ecosystem functioning. However, studying trophic interactions is challenging in meta-ecosystems, that is ecosystems connected by spatial flows of energy, materials and organisms across ecosy

stem boundaries. While analytical methods based on abundances of polyunsaturated fatty acids (PUFAs) and stable isotopes of amino acids (AAs) are being increasingly used, it has never been explored if both approaches could be: (i) combined in mixing models to enhance precision in dietary inference (ii) compared to disentangle transfers of various PUFAs and proteins in food webs in the wild.

2. We explore the utility of analytical approaches based on PUFA abundances and AA isotopes to resolve resource transfers in a natural riparian food web. We focus on spiders and their potential prey from blue, green and brown sources to address three important and persisting methodological issues in food-web ecology, namely whether (i) essential AA carbon isotopes can resolve protein origin from blue, green and brown resources, (ii) PUFA relative abundance and AA isotopes can be combined in a mixing model to provide higher precision estimates (i.e. narrower intervals) and (iii) combining the two approaches can unveil the coupling of protein and PUFA transfers in food webs.

3. Our research demonstrates the power of AA isotopes and PUFAs to distinguish blue, green, and brown sources and their transfer up to consumers. We show that combining PUFA relative abundance and AA isotopes in a mixing model provides overall estimates similar to the individual estimates but significantly increases precision. In addition, we showcase how combining approaches unveil the coupling of protein and PUFA transfers. For instance, we show that most PUFAs are less concentrated from prey to predators, relative to proteins, highlighting uncoupling of PUFAs and protein transfer along food chains.

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. ' (77 chars) title => protected'Elimination resistance: characterizing multi-compartment toxicokinetics of t

he neonicotinoid thiacloprid in the amphipod <em>Gammarus pulex</em> using bioconcentration and receptor-binding assays' (195 chars) journal => protected'Environmental Science and Technology' (36 chars) year => protected2023 (integer) volume => protected57 (integer) issue => protected'24' (2 chars) startpage => protected'8890' (4 chars) otherpage => protected'8901' (4 chars) categories => protected'bioaccumulation; invertebrates; micropollutants; organic contaminants; insecticides' (83 chars) description => protected'Delayed toxicity is a phenomenon observed for aquatic invertebrates exposed to nicotinic acetylcholine receptor (nAChR) agonists, such as neonicotinoids . Furthermore, recent studies have described an incomplete elimination of neonicotinoids by exposed amphipods. However, a mechanistic link between receptor binding and toxicokinetic modeling has not been demonstrated yet. The elimination of the neonicotinoid thiacloprid in the freshwater amphipod <em>Gammarus pulex</em> was studied in several toxicokinetic exposure experiments, complemented with in vitro and in vivo receptor-binding assays. Based on the results, a two-compartment model was developed to predict the uptake and elimination kinetics of thiacloprid in <em>G. pulex</em>. An incomplete elimination of thiacloprid, independent of elimination phase duration, exposure concentrations, and pulses, was observed. Additionally, the receptor-binding assays indicated irreversible binding of thiacloprid to the nAChRs. Accordingly, a toxicokinetic-receptor model consisting of a structural and a membrane protein (including nAChRs) compartment was developed. The model successfully predicted internal thiacloprid concentrations across various experiments. Our results help in understanding the delayed toxic and receptor-mediated effects toward arthropods caused by neonicotinoids. Furthermore, the results suggest that more awareness toward long-term toxic effects of irreversible receptor binding is needed in a regulatory context. The developed model supports the future toxicokinetic assessment of receptor-binding contaminants.' (1593 chars)

serialnumber => protected'0013-936X' (9 chars) doi => protected'10.1021/acs.est.3c01891' (23 chars) uid => protected31058 (integer) \_localizedUid => protected31058 (integer)modified \_languageUid => protectedNULL \_versionedUid => protected31058 (integer)modified pid => protected124 (integer) Saboret, G.; Moccetti, C.; Wassenaar, L. I.; Matthews, B.; Aquino, N. J.; Janssen, D. J.; Brodersen, J.; Schubert, C. J. (2025) Impact of glaciers on trophic dynamics and polyunsaturated fat accumulation in Southern Greenland Fjord ecosystems, *Global Change Biology*, 31(1), e70044 (19 pp.), doi:10.1111/gcb.70044, Institutional Repository

Saboret, G.; Drost, B. J. W.; Kowarik, C.; Schubert, C. J.; Gossner, M. M.; Ili?, M. (2024) Quantifying the utilisation of blue, green and brown resources by riparian predators: a combined use of amino acid isotopes and fatty acids, *Methods in Ecology and Evolution*, 15(8), 1450-1462, doi:10.1111/2041-210X.14371, Institutional Repository

Raths, J. (2023) Bioaccumulation of polar organic contaminants in aquatic invertebrates: impact of climate, uptake pathways and spatial distribution, 288 p, doi:10.3929/ethz-

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[b-000641995](#), [Institutional Repository](#)

Raths, J.; Schinz, L.; Mangold-Döring, A.; Hollender, J. (2023) Elimination resistance: characterizing multi-compartment toxicokinetics of the neonicotinoid thiacloprid in the amphipod *Gammarus pulex* using bioconcentration and receptor-binding assays, *Environmental Science and Technology*, 57(24), 8890-8901, [doi:10.1021/acs.est.3c01891](#), [Institutional Repository](#)

Cover picture: The melting of glaciers is changing food webs in aquatic environments, as seen here in Greenland, but also in alpine regions. (Foto: Coralie Moccetti)

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<https://www.eawag.ch/en/info/portal/news/news-detail/otto-jaag-prize-awarded-twice-for-2025>