



## **ETH Medaillen für Barbara Günthardt, Matthew Moy de Vitry und Marius Neamtu**

18. Oktober 2021 | Claudia Carle und Andri Bryner  
Themen: Institutionelles

**Die Umweltchemikerin Barbara F. Günthardt sowie die beiden Umweltingenieure Matthew Moy de Vitry und Marius Neamtu werden für ihre Doktorarbeiten mit der ETH-Medaille ausgezeichnet. Pflanzengifte, Hochwasser in der Stadt und komplizierte Strömungen waren die Themen. Wir gratulieren herzlich!**

Die Umweltchemikerin Barbara F. Günthardt erhält für ihre Doktorarbeit zu Pflanzengiften die ETH-Medaille. Sie hat nicht nur Methoden zur Quantifizierung dieser Stoffe entwickelt, sondern auch eine Datenbank aufgebaut und für einzelne Stoffe die freisetzenden Pflanzen identifiziert.

### **Datenbank der Giftpflanzenstoffe aufgebaut**

Geht es um Mikroverunreinigungen im Wasser, denken die meisten wohl primär an Pestizide, Arzneimittel oder Chemikalien aus Haushalten und Industrie. Doch es gibt auch tausende Stoffe pflanzlichen Ursprungs, die toxisch sind. In ihrer Dissertation hat Barbara F. Günthardt rund 1600 dieser Stoffe von über 800 Pflanzen und ihre Wirkung auf die aquatische Umwelt zusammengetragen und in Gewässern danach gesucht. Nun wird ihr für den systematischen und sorgfältig erarbeiteten Ansatz die ETH-Medaille verliehen.

Ausgehend von einer neu aufgebauten Datenbank hat die Doktorandin rund 500 Toxine aufgrund ihrer Langlebigkeit, ihren chemisch-physikalischen Eigenschaften und der Häufigkeit des Vorkommens priorisiert. Im *Journal of Agricultural and Food Chemistry* der ACS hat sie dazu einen eigenen Artikel publiziert [1] und in *Science of the Total Environment* [2]. Zudem ist die Datenbank TPPT (für Toxic Plant-PhytoToxin) über die Agroscope-Webseite frei verfügbar [3].

Barbara Günthardt hat in ihrer Dissertation anschliessend eine analytische Methode entwickelt, um die 134 wichtigsten Phytotoxine in Proben mit hochaufgelöster Massenspektrometrie zu quantifizieren. Ihre Methode hat sie auch gleich im Feld angewendet und Proben aus 20 Bächen untersucht. In einer Sonderausgabe der Zeitschrift *Chimia* über «Chemie und Umwelt» hat sie dazu einen Artikel veröffentlichen können [4]. Einen besonderen Fokus hat Günthardt auf die Untersuchung von Pyrrolizidin-Alkaloiden gelegt. Weltweit kommen diese Stoffe in rund 6000 Pflanzen vor, die sich damit vor Verbiss schützen. Einige wirken bei Tieren lebertoxisch, genotoxisch oder kanzerogen. Als Hauptverursacher in den Proben aus Schweizer Bächen – mit teilweise beträchtlichen Konzentrationen – hat die Forscherin das invasive Greiskraut *Senecio inaequidens* entlarvt. Auch dazu konnte Günthardt einen Fachartikel publizieren, und zwar in der Zeitschrift *Environmental Science and Technology* [5].

Die 4 Publikationen der Dissertation mit dem Titel «A Systematic Assessment of the Aquatic Exposure to Phytotoxins» sind open access in [DORA](#) verfügbar. Die Doktorarbeit selbst <https://doi.org/10.3929/ethz-b-000488067> ist aktuell noch unter Embargo. Die Arbeit wurde gemeinsam betreut von Dr. Thomas Bucheli (Agroscope) und Prof. Juliane Hollender (Eawag und ETH). Die meisten Arbeiten liefen bei Agroscope, Barbara Günthardt konnte auf Probenahmeausrüstung und die hochauflösenden analytischen Geräten an der Eawag zurückgreifen.

### Vorhersage von Hochwässern

Matthew Moy de Vitry erhält die Auszeichnung für seine Dissertation zum Thema «Public Surveillance and the Future of Urban Pluvial Flood Modelling» [6] bei Prof. Max Maurer in der Abteilung Siedlungswasserwirtschaft. Ziel seiner Arbeit war es, die Vorhersage von Hochwässern in Städten zu verbessern und damit letztlich Bevölkerung und Infrastruktur besser schützen zu können. Da die für die Vorhersage genutzten Modelle zuvor auf Grund fehlender Daten für die Kalibrierung und Validierung nicht zuverlässig genug waren, entwickelte er innovative und kostengünstige Ansätze für zusätzliche Datenquellen – etwa Bilder und Videos von Verkehrsüberwachungskameras oder aus sozialen Medien. Für diese Arbeit wurde Matthew im November 2020 auch schon mit dem [Otto-Jaag-Gewässerschutzpreis](#) geehrt.

«Ich würde die ETH-Medaille am liebsten in Stücke schneiden und mit den vielen Kolleginnen und Kollegen teilen, welche die Arbeit möglich gemacht haben», meint Matthew, «also Betreuer, Techniker, Co-Autoren und alle Menschen, die zur speziellen Eawag-Atmosphäre beitragen».

Seit Abschluss seiner Dissertation ist Matthew als Webentwickler und Datenwissenschaftler beim ETH-Spin-off Hades Technologies AG tätig, der Datenmodelle entwickelt, die Schäden in Abwasserkanälen automatisch mittels maschinellem Lernen erkennen können.

### Turbulente Strömungen besser verstehen

Marius Neamtu erhält die ETH-Medaille für seine Dissertation zum Thema «Objective Coherent Structures Near the Turbulent/Non Turbulent Interface in a Stably Stratified Turbulent Flow» [7] bei Prof. Markus Holzner (Eawag/WSL) in der Abteilung Oberflächengewässer. Diese Arbeit leistet einen Beitrag dazu, um turbulente Strömungen besser zu verstehen. Solche Strömungen sind in der Natur und in industriellen Anwendungen allgegenwärtig, etwa beim Rauch, der aus einem Kamin entweicht. In vielen turbulenten Strömungen (z. B. turbulenten Freistrahlen, Nachläufen und Grenzschichten) wird wirbelfreies Fluid aus der Umgebung über eine scharfe Grenzfläche – die sogenannte turbulente/nichtturbulente Grenzfläche – kontinuierlich in den turbulenten Bereich hineingerissen. Dieses Phänomen, das als turbulente Einmischung bezeichnet wird, wirkt sich unmittelbar auf die Entstehung und Entwicklung turbulenter Strömungen aus. Marius untersuchte insbesondere die Rolle von Wirbelstrukturen bei diesem Prozess. Um diese Wirbelstrukturen in turbulenten Strömungen zu entschlüsseln, wendete er neue mathematische Methoden an und zeigte, wie diese Strukturen die turbulente Einmischung beeinflussen. Das liefert eine wichtige Grundlage, um turbulente Strömungen



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metabolites (phytotoxins) for defens
e is a widespread phenomenon in the plant kingdom and is even present in agr
icultural crops. These phytotoxins may have similar characteristics to anthr
opogenic micropollutants in terms of persistence and toxicity. However, they
are only rarely included in environmental risk assessments, partly because
a systematic overview of phytotoxins is missing. Here, we present a newly de
veloped, freely available database, Toxic Plants-PhytoToxins (TPPT), contain
ing 1586 phytotoxins of potential ecotoxicological relevance in Central Euro
pe linked to 844 plant species. Our database summarizes phytotoxin patterns
in plant species and provides detailed biological and chemical information a
s well as in silico estimated properties. Using the database, we evaluated p
hytotoxins regarding occurrence, approximated from the frequencies of Swiss
plant species; environmental behavior based on aquatic persistence and mobil
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e potential aquatic micropollutants and should be included in environmental investigations.' (1155 chars) serialnumber => protected'0021-8561' (9 chars) doi => protected'10.1021/acs.jafc.8b01639' (24 chars) uid => protected20138 (integer) \_localizedUid => protected20138 (integer)modified \_languageUid => protectedNULL \_versionedUid => protected20138 (integer)modified pid => protected124 (integer) Günthardt, B. F.; Hollender, J.; Hungerbühler, K.; Scheringer, M.; Bucheli, T. D. (2018) Comprehensive toxic plants-phytotoxins database and its application in assessing aquatic micropollution potential, *Journal of Agricultural and Food Chemistry*, 66(29), 7577-7588, doi:10.1021/acs.jafc.8b01639, [Institutional Repository](#)

## [2]

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ght potentially be most critical for aquatic organisms.' (1651 chars) serialnumber => protected'0048-9697' (9 chars) doi => protected'10.1016/j.scitotenv.2021.149128' (31 chars) uid => protected23249 (integer) \_localizedUid => protected23249 (integer)modified \_languageUid => protectedNULL \_versionedUid => protected23249 (integer)modified pid => protected124 (integer) Günthardt, B. F.; Hollender, J.; Scheringer, M.; Hungerbühler, K.; Nanusha, M. Y.; Brack, W.; Bucheli, T. D. (2021) Aquatic occurrence of phytotoxins in small streams triggered by biogeography, vegetation growth stage, and precipitation, *Science of the Total Environment*, 798, 149128 (11 pp.), doi:10.1016/j.scitotenv.2021.149128, [Institutional Repository](#)

[3]

[Agroscope - Giftpflanzen – Phytotoxin Datenbank \(TPPT\)](#)

[4]

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## [5]

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analysis reveal a wide exposure to pyrrolizidine alkaloids in small streams, *Environmental Science and Technology*, 55, 1036-1044, doi:10.1021/acs.est.0c06411, Institutional Repository

## [6]

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pographie, beweglicher Hindernisse und der Gefahr von Vandalismus an ihre Grenzen. Deswegen gibt es ...' (2407 chars) serialnumber => protected" (0 chars) doi => protected'10.3929/ethz-b-000397587' (24 chars) uid => protected20182 (integer) \_localizedUid => protected20182 (integer)modified \_languageUid => protectedNULL \_versionedUid => protected20182 (integer)modified pid => protected124 (integer) Moy de Vitry, M. (2019) Public surveillance and the future of urban pluvial flood modelling, 143 p, doi: 10.3929/ethz-b-000397587, Institutional Repository

## [7]

Neamtu-Halic, Marius M. (2020). Objective Coherent Structures Near the Turbulent/Non-Turbulent Interface in a Stably Stratified Turbulent Flow (Doctoral dissertation, ETH Zurich). <https://doi.org/10.3929/ethz-b-000476303>

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<https://www.eawag.ch/de/info/portal/aktuelles/newsarchiv/archiv-detail/eth-medailen-fuer-barbara-guenthardt-matthew-moy-de-vitry-und-marius-neamtu>