



## ETH medals for Moritz Gold and Aryeh Feinberg

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Topics: Organisation & Staff

**Moritz Gold and Aryeh Feinberg have been awarded the 2021 ETH medals for their outstanding doctoral theses. The topics of the two dissertations were the utilization of organic waste for breeding the larvae of the black soldier fly, and the modelling of atmospheric sulphur and selenium cycles.**

The silver medals of ETH Zurich were awarded at the graduation ceremony for students receiving master's and doctoral degrees. The award honours excellent theses and dissertations with a prize of 2,000 Swiss francs.

### Moritz Gold: The perfect menu for fly larvae

The larvae of the black soldier fly (*Hermetia illucens*) are a promising and sustainable alternative animal feed for use in agriculture. Various types of organic waste serve as food for the larvae, including organic household waste, cow manure and restaurant waste. However, the combinations of nutrients and the microbiology of the organic waste vary, which means that the larvae grow at different rates, resulting in numerous problems with commercial breeding operations.

In his ETH-medal award-winning dissertation "Towards more efficient biowaste utilization with black soldier fly larvae to produce more sustainable animal feed", Moritz Gold investigated practical solutions for reducing the variability of fly larvae development. The first step was the analysis of the nutrient content of each type of waste, followed by adjustments to the carbohydrate and protein content of each substrate. To further improve this approach, Moritz investigated the residence time of organic waste in the digestive tract of the insects and developed the first in vitro model for black soldier fly larvae. In his doctoral thesis he demonstrated how organic waste can be systematically combined so that the larvae grow in a more controlled manner and heterogeneous organic waste can be efficiently utilised. He has

thus developed the perfect menu for the fly larvae.

“I was absolutely delighted to receive the award. I was especially pleased that this topic was considered relevant and that it was deemed to be good research, and also that professors in other research areas were enthused by the subject matter” said Moritz Gold. The insects still occupy his time, even though he has finished his dissertation: he is currently working in a postdoc position at ETH Zurich as well as working in his own company where he works with companies and start-ups worldwide to commercially establish insect breeding on organic waste for the production of sustainable animal feed.

### **Aryeh Feinberg: Gaining a better understanding of sulphur and selenium deposits**

Aryeh Feinberg, who was a researcher in Eawag’s department of Water Resources and Drinking Water until February 2021, received the award for his dissertation on “The atmospheric sulfur and selenium cycles: a global model of transport and deposition”. The aim of his work was to model the atmospheric cycles of two chemical elements, sulphur and selenium. Sulphur is of major import for economically useful plants, and selenium is important for human health. Since there was very little existing research on the atmospheric contribution of these elements in agricultural soil, especially in the case of selenium, Aryeh Feinberg used a global atmospheric chemistry-climate model to map past and future selenium deposits. Using this method, he was able to demonstrate that sulphur and selenium emissions had decreased in recent years, thanks to cleaner emissions technologies and the reduced use of coal. His study concluded that the proportion of sulphur and selenium coming from the atmosphere will also decline in the future, thus increasing the risk of nutrient deficits in agricultural systems. The conclusions of his dissertation thus call for comprehensive monitoring of nutrient trends in agricultural systems, as well as the development of sustainable solutions for the problem of decreasing nutrient contributions.

For Aryeh Feinberg the award is the product of a collaborative and motivating environment: “It was an interdisciplinary project requiring the close collaboration of researchers from various areas: meteorology, atmospheric chemistry, biogeochemistry, high-performance computing and statistics. The dissertation will serve as an example to researchers of how to assess trace-element cycles.”

Since finishing his dissertation, Aryeh Feinberg has been working as a postdoc at the Massachusetts Institute of Technology (MIT), where his research is examining the biogeochemical cycle of mercury. He plans to use some of the statistical methods from his doctorate to quantify the amount of mercury that is released globally by artisanal gold mining.

Cover picture: Provided by Moritz Gold and Aryeh Feinberg

### **Original publications**

Gold, M. (2020) Towards more efficient biowaste utilization with black soldier fly larvae to produce more sustainable animal feed (Doctoral thesis, ETH Zurich), 148 p, [doi:10.3929/ethz-b-000458647](https://doi.org/10.3929/ethz-b-000458647)

Feinberg, A. (2020) The atmospheric sulfur and selenium cycles: a global model of transport and deposition (Doctoral thesis, ETH Zurich) [doi:10.3929/ethz-b-000451136](https://doi.org/10.3929/ethz-b-000451136)

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