

UMX2 Micro Balance to Determine Fitness of *Daphnia*

The observation of a continuous decline of the local whitefish population in Lake Brienz, a lake situated at the foot of the Swiss Alps, has been the core topic of a research project at Eawag (Swiss Federal Institute of Aquatic Science and Technology) in Switzerland. In the course of this project a METTLER TOLEDO UMX2 micro balance was used to study the growth of *Daphnia* of Lake Brienz under different food conditions.

Lake Brienz Project

Eawag is a Swiss-based and internationally linked aquatic research institute committed to an ecological, economical and socially responsible management of water – the primary source of all life. It carries out research, education and consultation and forms a link between scientific and practical applications. Research in the Department of Aquatic Ecology focuses on understanding the structure and function of freshwater ecosystems. It aims to contribute to the general ecological theory, investigating and solving specific environmental problems related to freshwater systems.

As part of the multi-disciplinary project, initiated with the objective of analyzing and understanding the lake's nutrients and the effects of the anthropogenic activity (hydropower plant) in the glaciated area above, Christian Rellstab, PhD student at the Department of Aquatic Ecology, studied the *Daphnia* population of Lake Brienz. The main objective of his research work was to find out why the *Daphnia* population of Lake Brienz could not be detected anymore in samples of the year 1999. This was of major interest as this species is the most important food source of whitefish in Lake Brienz and therefore the conclusion was drawn that the decline of fishing yields during those years was directly influenced by the extremely low number of *Daphnia* in the lake.



***Daphnia* – a Water Flea Helps Find the Answer**

Daphnia are small, mostly planktonic crustaceans, and reach a maximal length of 2 mm in Lake Brienz. This species is a member of the order Cladocera and is one of the several small aquatic crustaceans commonly called water fleas due to their size and swimming style. They live in various aquatic environments, including freshwater lakes, and provide an



important source of food for many larger aquatic organisms including various fish species. They are easy to cultivate in the laboratory and are frequently used to test the effects of toxicants on reproduction and survival.



UMX2 Micro Balance and the Growth Rate of *Daphnia*

During the course of the project, Christian Rellstab studied the growth of the *Daphnia* species in the laboratory in relation to varying food and suspended sediment concentrations in order to discover how the population was influenced by the changing availability of algae and glacial melt water. The fitness of *Daphnia* can be studied by measuring the increase in weight of the organism over a certain time period. In his experiment the dry weight of *Daphnia* ranged from 4 µg for freshly hatched juveniles to 95 µg for adult organisms with an age of 6 days.

tantly, they needed a balance with a high resolution and a small repeatability in order to guarantee comparable results. To feature optimal conditions, the balance was placed on a massive stone table with the air conditioning shut off during weighing. For weighing-in the *Daphnia*, a small aluminum cylinder is used which is then placed onto the balance with tweezers. The automatic door of the UMX micro balance clearly facilitates this task. Christian Rellstab is very happy with the purchase of the new micro balance as it is easy to use but, even more importantly; it produces precise and highly reproducible results in order to study the effect of vary-



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To study such a minuscule weight, the research group of Christian Rellstab decided to purchase a UMX2 micro balance from METTLER TOLEDO. Most impor-

ing food conditions on the development of *Daphnia* in a simple and effective way.

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