

## New whitefish species discovered

In Lake Lucerne, a new species of whitefish has been discovered by biologist Bänz Lundsgaard-Hansen and his colleagues from Ole Seehausen's research group. Unofficially, it is called the "Schwebbalchen". Previously, four species of whitefish were known to occur in Lake Lucerne – *Coregonus suidteri* ("Balchen"), *Coregonus zugensis* ("Albeli"), *Coregonus nobilis* ("Edelfisch") and the so-called "Alpnacher-Felchen". The evolutionary biologists from Eawag chose the name "Schwebbalchen" because the species is found at a depth of 10–30 m – floating (= "schweben") between the habitats of the larger "Balchen", which prefers a depth of 10 m, and the smaller "Albeli", which lives and spawns at a depth of around 40 m. Why had this species not previously been identified as such, even though it occurs in large numbers? According to Lundsgaard-Hansen, the professional fishermen may have rarely fished in these mid-depths and had presumably identified the unknown species as young and small-sized "Balchen".

### Not from another lake

The "Schwebbalchen" was determined to be a distinct species on the basis of precise measurements of 14 body shape traits, as well as analyses of 14 genetic loci. Both methods indicated that, although closely related to the Lake Lucerne "Balchen" and "Albeli", it is clearly differentiated. However, comparison with whitefish from other Swiss lakes showed fewer similarities. Thus, it is not, as was originally supposed, a species introduced to Lake Lucerne from another lake.

### Increase in hybridization

In response to the eutrophication of lakes, whitefish species – like the cichlids in Lake Victoria – exhibit increased hybridization, as shown by the Eawag researchers on the basis of a large, as yet unpublished data series compiled by Pascal Vonlanthen and others. From the middle of the 20<sup>th</sup> century, Lake Lucerne received increased nutrient inputs from wastewater and agricultural runoff. In the

deeper waters, oxygen was depleted. As a result, the "Albeli" shifted into shallower waters, moving closer – in every sense – to the "Schwebbalchen" and "Balchen". Whether the increase in hybridization among the three species may ultimately lead to a single hybrid species cannot yet be said. As the lake water is now cleaner again and all depths are well supplied with oxygen, there is a good chance that all three species will survive in Lake Lucerne. Today, the "Albeli" can once again spawn in deeper waters. In other large Swiss lakes, however, improvements in water quality probably came too late to preserve the original species diversity. These findings not only help to improve our understanding of the formation and disappearance of species but also provide a basis for sustainable lake fishery management.

**It is fascinating that new species can still be discovered here in Switzerland, not just in the tropics.**



Top to bottom: "Balchen" (*Coregonus suidteri*), "Schwebbalchen" and "Albeli" (*Coregonus zugensis*) from Lake Lucerne.

### What is a species?

Various concepts of a species are found in evolutionary biology. What all have in common is that populations of organisms are assigned to different species if they coexist in nature over many generations at the same site without genetically merging. Numerous species hybridize occasionally but remain differentiated as long as mechanisms exist that restrict gene flow. The definition

of a species as a group of individuals not capable of interbreeding with members of other species is a popular misconception. ○○○

Contact:

Prof. Dr Ole Seehausen, ole.seehausen@eawag.ch

Bänz Lundsgaard-Hansen, baenz.lundsgaard@eawag.ch