



## Press release no. 61/2018

### Decoding the Genome of the European cave fish

#### 2018 Plant and Animal SMRT Grant for research project involving Konstanz fish ecologist PD Dr Jasminca Behrmann-Godel

The first European cave fish was discovered in 2015 by cave diver Joachim Kreisler in Southern Germany – a great surprise for the scientific community. It is the only cave fish known to exist in Europe and the northern most of its kind in the world. Since then, researchers from Konstanz, Oldenburg and Berlin have successfully carried out the first genetic analyses of the fish. In order to now sequence the cave fish's genome and then to further investigate its genome via comparative studies, the research project was awarded the 2018 Plant and Animal SMRT Grant. The grant is co-sponsored by Pacific Biosciences (PacBio) of California and GENEWIZ in New Jersey, USA.

With the 2018 Plant and Animal SMRT Grant, PD Dr Jasminca Behrmann-Godel from the Limnological Institute at the University of Konstanz and her colleagues will receive the opportunity to establish the genome assembly of the cave fish. A genome assembly is created by fragmenting chromosomes in the DNA, then sequencing those fragments and finally putting them back together to assemble the genome. To successfully carry out this procedure, Dr Arne Nolte from the Institute for Biology and Environmental Sciences at the University of Oldenburg in Germany, and Assistant Professor Fritz Sedlazeck from the Human Genome Sequencing Center at the Baylor College of Medicine in Houston, USA will be provided access to both cutting-edge genome sequencing technology from PacBio as well as bioinformatic support services from GENEWIZ.

The researchers will benefit, amongst other things, from a DNA sequencing procedure that will generate complete and accurate views of the genome. According to GENEWIZ, this sequencing is characterized by "long read lengths with uniform coverage, which leads to high accuracy and contiguity, both essential to generate complete and accurate views of a genome." In this way "the genetic material of the cave fish can be assembled and analysed very quickly – something that would have been unthinkable until recently for most species," explains Arne Nolte.

For Jasminca Behrmann-Godel, decoding the genome will "play a crucial role in moving ahead with the genetic comparison between our cave fish and related surface populations." She and her colleagues are particularly interested in looking at genetic changes that are responsible for several distinguishing morphological adaptations of this European cave fish, such as its reduced eye size, larger nostrils and reduced pigmentation.

In addition to identifying the genetic variants from its surface cousins and the evolutionary changes to its sensory system, Fritz Sedlazeck looks forward to being able to compare the genomic makeup of the European cave fish with that of the Mexican cave fish *Astyanax mexicanus*: "The outcome of this study will enable us to understand the initial steps that lead to the evolution of cave animals."

The recently discovered cave fish, a loach belonging to the genus *Barbatula*, is found in the Danube-Aach underground karst system in Southern Germany. Through the initial genetic analyses combined with knowledge of local geological history, Jasminca Behrmann-Godel and her research colleagues were able to conclude that this particular fish species diverged from surface populations within a 20,000 year time period. These research results were published in the scientific journal Current Biology in April 2017.

In order for PacBio and GENEWIZ to help assemble the genome of the European cave fish in the United States, Arne Nolte will send them DNA samples of fish first collected by Joachim Kreiselmaier from the caves of the Danube-Aach system and subsequently cared for by Jasminca Behrmann-Godel from the Limnological Institute of the University of Konstanz.

**Facts:**

- Researchers collaborating with University of Konstanz fish ecologist PD Dr Jasminca Behrmann-Godel in the study of the first European cave fish receive the 2018 Plant and Animal SMRT Grant.
- Grant winners are Professor Arne Nolte from the Institute for Biology and Environmental Sciences at the University of Oldenburg, and Assistant Professor Fritz Sedlazeck from the Human Genome Sequencing Center at Baylor College of Medicine in Houston, USA
- Grant is provided by Pacific Biosciences of California, USA together with GENEWIZ headquartered in New Jersey, USA
- Researchers will receive access to both cutting-edge genome sequencing technology and expert bioinformatic support services
- The resulting genome assembly will allow Dr Behrmann-Godel and her colleagues to carry out genetic comparisons with surface fish populations as well as genomic comparisons with other cave fish species such as the Mexican cave fish.
- Press article about the discovery of the cave fish: <https://www.uni-konstanz.de/en/university/news-and-media/current-announcements/news/news-in-detail/sensationsfund-am-bodensee/>

**Note to editors:**

You can download photos here:

[https://cms.uni-konstanz.de/fileadmin/pi/filesserver/2018/Bilder/H%C3%B6hlenfisch\\_schwarz.jpg](https://cms.uni-konstanz.de/fileadmin/pi/filesserver/2018/Bilder/H%C3%B6hlenfisch_schwarz.jpg)

Caption: Cave fish from the Danube-Aach underground karst system in Southern Germany

Photo: University of Konstanz

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