Clemson makes international breakthrough for understanding aging process

MEDIA RELEASE

Jim Melvin, Public Service Activities

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The killifish is an ideal model for studying the aging process at the molecular level.
Image Credit: Leibniz Institute for Age Research

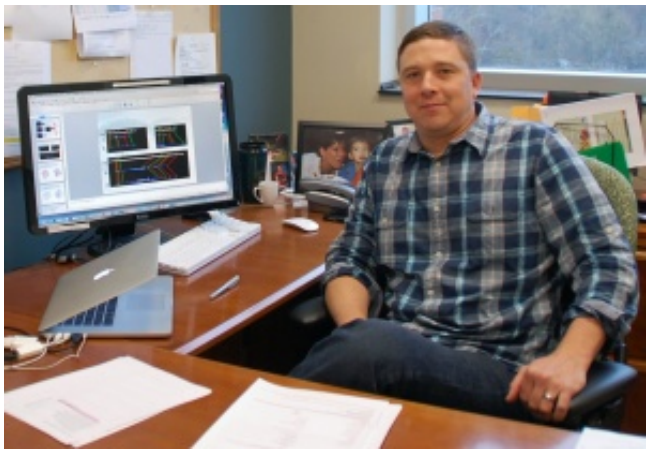
CLEMSON — A small fish with a short lifespan might eventually have large and long-lived consequences for humankind thanks to an international collaboration between the Clemson University Genomics and Computational Biology Laboratory and the Leibniz Institute for Age Research.

Clemson researchers, in conjunction with scientists from the renowned German institute, have cloned the genome of the African turquoise killifish. Despite being less than three inches long, the killifish still contains about 1.9 billion base pairs of DNA, which is about two-thirds the size of the human genome.

The killifish — which lives between three and 10 months — ages in ways similar to how human beings age, such as having reduced activity levels and weakening of fertility, along with changes in coloration.

Even in the laboratory, where water and food quality

are optimal, the creature's lifespan is comparable to those of its kind in the wild, which suggests that its extremely brief time on Earth is genetically rather than environmentally predetermined. This makes the fish, which is a popular choice for home aquariums, an ideal model for studying the aging process at the molecular level.



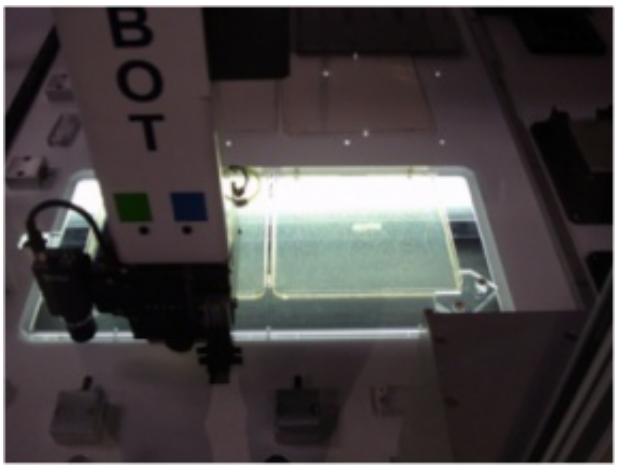
Chris Saski is director of Clemson's genomics and computational facility. ***Image Credit: Clemson University***

"Clemson maintains one of the world's largest collections of agriculturally important genomic libraries and we're building collaborations with the Leibniz Institute for Age Research-Fritz Lipmann Institute in Jena and others to increase our vertebrate collection," said Chris Saski, director of Clemson's genomics and computational facility.

"This genomic resource is a platform to systematically identify genes and genomic signatures to advance our understanding of aging. With the genomic library, researchers can begin to focus on specific genes and their organization and learn how they are turned on and off at the DNA level."

In February, Clemson University and the Leibniz Institute made the genomic library of the killifish available to the worldwide scientific community. The recent breakthrough will provide scientists with an invaluable resource in studying biomedical aging. There are 45 research groups currently working on projects related to the killifish, according to Leibniz, and researchers have already begun to identify regions in

the fish's genome where the information about short life expectancy is encoded.



The killifish genomic library was prepared by fragmenting the genome into 130,000 pieces. This robot was used to array the final library format.
Image Credit: Clemson University

"We extracted nuclear DNA from a single fish," said Saski, who described a genomic library as an ordered catalog of DNA fragments. "Then we chopped the 1.9 billion base pairs into manageable pieces of about 150,000 base pairs on average. This library can fit on a single shelf of an ultralow freezer.Making a genomic library is a very difficult thing to do, and it's a merger of science and art. I think it's important to Clemson and to the state of South Carolina that we're one of only four or five places in the world that can do it."

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Clemson University Genomics and Computational Lab

The Clemson University Genomics and Computational Lab is a molecular and computational facility within the Institute for Translational Genomics. The institute is positioned to competitively address complex problems in agriculture, human health and environmental systems.

Leibniz Institute for Age Research-Fritz Lipmann Institute

The Leibniz Institute for Age Research-Fritz Lipmann Institute is the first German research organization

dedicated to biomedical aging research. More than 330 members from more than 30 nations explore the molecular mechanisms underlying aging processes and age-associated diseases.

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