



## NIBB Press Release

National Institute for Basic Biology

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2015.06.10

Embargoed: Not for Release Until 14:00 U.S. Eastern Time Thursday, 11 June 2015.

### "To be sperm, or not to be sperm?"

#### -Discovery of the genetic switch that determines Germ Cell fate-

Researchers in Japan have found, for the first time in vertebrates, a genetic switch that determines whether germ cells become sperm or eggs. The gene is named *foxl3*, and has been identified using a small fish called medaka (*Oryzias latipes*). In medaka without this gene's functionality, surprisingly, sperm are produced in the ovaries of females. The sperm that are produced function normally, and have been confirmed to produce normal offspring. These results will be announced in the journal *Science* through *Science Express* the online pre-print version on June 11<sup>th</sup>.

Dr. Toshiya Nishimura, Associate Professor Minoru Tanaka and their colleagues of the National Institute for Basic Biology, in collaboration with Dr. Satoru Kobayashi of the Okazaki Institute for Integrative Bioscience, and through joint research with Kyushu University's Dr. Mikita Suyama and Dr. Yasuyuki Ohkawa, revealed that the *foxl3* gene works in the germ cells of females "to suppress differentiation into sperm".

In females lacking functional *foxl3* genes, the small fish's body appearance is still totally female, however a large number of sperm are formed in the ovaries, and a small number of eggs are formed at the same time.

It has also become clear that in these females lacking the function of *foxl3* functional sperm can be obtained in a shorter period of time than in normal wild-type males. Applied research into uses for aquaculture is already underway.

"In spite of the environment surrounding the germ cells being female, the fact that functional sperm has been made surprised me greatly. That this sexual switch present in the Germ Cells is independent of the body's sex is an entirely new finding," Dr. Nishimura said.

Dr. Tanaka commented: "While germ cells can become either sperm or eggs, nobody knew that in vertebrates the germ cells have a switch mechanism to decide their own sperm or egg fate. Our result indicates that once the decision is made the germ cells have the ability to go all the way to the end. I believe it is of very large significance that this mechanism has been found."

**Office of Public Relations**

National Institute for Basic Biology

E-mail: [press@nibb.ac.jp](mailto:press@nibb.ac.jp)

Nishigonaka 38, Myodaiji, Okazaki 444-8585 Aichi, Japan

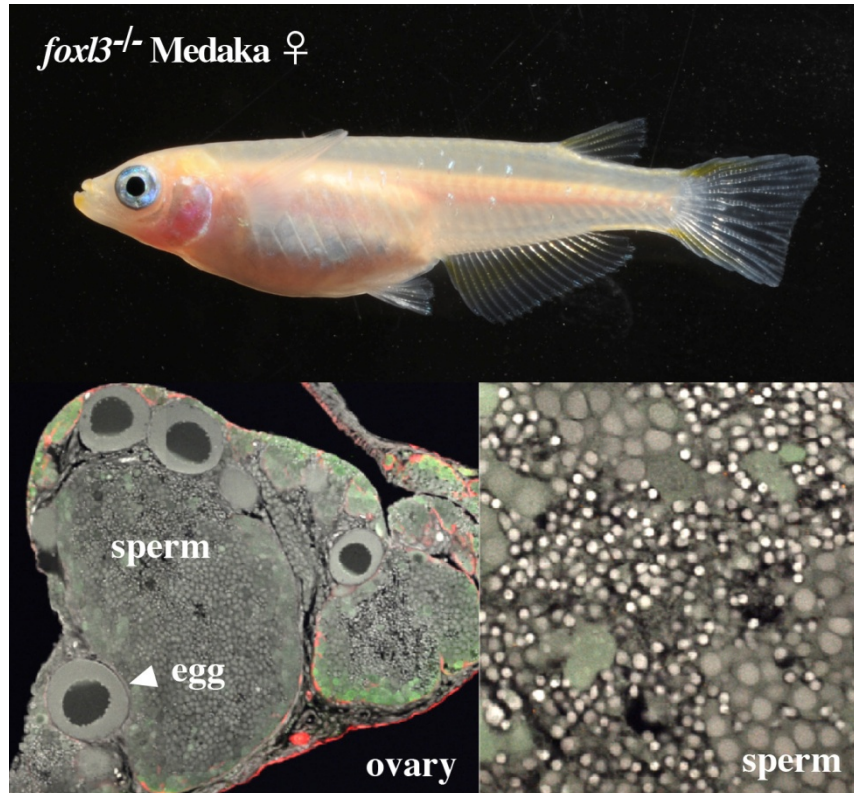


Photo 1:

*Top* - Female medaka lacking *foxl3* genes showing standard female body shape. *Bottom* - In the ovaries of *foxl3* mutant female medaka, a large number of sperm and a small number of eggs are formed.



Photo 2:

Young medaka born using normal eggs and sperm from female fish lacking functional *foxl3* genes.



Photo 3:

Dr. Toshiya Nishimura in an aquarium room at the National Institute for Basic Biology

### **Journal Information**

Journal and Online Publication Date:

*Science* within the *Science Express* Website

June 11, 2015 14:00 U.S. Eastern Time (June 12, 2015 3:00 Japan Time)

Title: *foxl3* is a germ cell-intrinsic factor involved in sperm-egg fate decision in medaka

Authors: Toshiya Nishimura, Tetsuya Sato, Yasuhiro Yamamoto, Ikuko Watakabe, Yasuyuki Ohkawa, Mikita Suyama, Satoru Kobayashi, and Minoru Tanaka.

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### **Contact information**

About this research

Minoru Tanaka

Laboratory of Molecular Genetics for Reproduction

National Institute for Basic Biology

E-mail: [mtanaka@nibb.ac.jp](mailto:mtanaka@nibb.ac.jp)

### **Office of Public Relations**

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E-mail: [press@nibb.ac.jp](mailto:press@nibb.ac.jp)

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Nishigonaka 38, Myodaiji, Okazaki 444-8585 Aichi, Japan