

# Fish placenta is unfavourable survival strategy

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Fish with a placenta struggle to adapt to rapid changes in the food supply. They probably evolved in a stable, food-rich environment. As ecosystems change under the influence of humans, they are experiencing greater difficulty in surviving than fish which lay eggs. Dutch researcher Bart Pollux has published his findings about this in the journal *Functional Ecology*.

Most fish lay eggs in the water. Some fish, however, give birth to live offspring. That can happen in two ways: the mother fish carries the eggs inside her until the embryos in the eggs are fully grown or the embryo grows in the [uterus](#) and is provided with nutrients via a placenta. Fish with placentas are often small fish that occur in [large numbers](#) in the tropics.

Bart Pollux investigated the placental species *Phalloptychus januarius*. He varied the food supply of the female fish and examined how rapidly they adapted to this. If Pollux increased or decreased the food supply then that led to almost immediate changes in the size and [fat content](#) of the offspring at birth. The process occurred very rapidly: five days after the change in food supply the birthweight and quantity of body fat had already changed. The fertility of the mother fish, however, changed much later after about eight weeks. This was an unexpected result.

At fertilization, the placental fish decides how many offspring she will produce: if there is a lot of food then many [offspring](#) will be born. If the food supply suddenly decreases after a while then a problem occurs. The

mother fish becomes weaker (Pollux saw the fish losing weight despite being pregnant) and her embryos are also very small at birth. A fish which lays eggs, always provided enough food for the number of eggs laid.

## **Bleak future**

This research demonstrates that [fish species](#) with a placenta could only have evolved in favourable times in a stable environment with a large food supply. Looking ahead, this research points to difficult times for these fish now that people have disrupted the ecosystems due to pollution and interventions in rivers (dams, deforestation around rivers). Fish with placentas cannot respond to these poorer conditions, and so they would appear to be a dead end in the evolutionary pathway. Pollux, however, suspects that placentas also offer major benefits if the food situation is favorable. He thinks that such mother fish can probably swim far better during pregnancy.

Pollux also investigated if fish with a placenta have a strategy that you would expect in this situation of a lower [food supply](#): aborting some of the embryos. That would improve the living conditions for both the mother fish, who has less burden, as well as for the remaining embryos, as the aborted [embryos](#) ultimately end up in the food system. However, he could find no evidence that placental fish can realise this strategy.

## **Rubicon**

This research was made possible with a grant from the NWO programme Rubicon. With a Rubicon grant scientists who have recently obtained their PhD can gain research experience at top foreign institutes.

Pollux carried out his research at the University of California (Riverside). With a lot of difficulty, he obtained permission to take the fish out of Brazil, a country that is well known for its strict measures against the export of living animals. Yet this fish was the ideal species for Pollux's research, as the female [fish](#) can carry 25 broods at once (so 25 embryo groups at the same time and in different stages of growth), a phenomenon that is termed superfoetation.

Provided by Netherlands Organisation for Scientific Research (NWO)

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