

Discus fish parent young like mammalian mothers

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Few fish are famed for their parenting skills. Most species leave their freshly hatched fry to fend for themselves, but not discus fish. Jonathan Buckley from the University of Plymouth, UK, explains that discus fish young feed on the mucus that their parents secrete over their bodies until they are big enough to forage.

'The parental care that they exhibit is very unusual,' says Buckley. Intrigued by the fish's lifestyle, Buckley's PhD advisor, Katherine Sloman, established a collaboration with Adalberto Val from the Laboratory of Ecophysiology and [Molecular Evolution](#) in Manaus, Brazil, and together with Buckley and Richard Maunder set up a colony of breeding discus fish to find out more about their strange behaviour. The team published their discovery, funded by the Leverhulme Trust, that discus fish parent their young like mammalian mothers on 29 October 2010 in The [Journal of Experimental Biology](#).

Unfortunately, discus fish are notoriously difficult to bred and keep in captivity. 'Hobbyists didn't succeed in rearing them until the 1970s,' explains Buckley. Having imported 30 adults from breeders in Malaysia, the team reproduced the breeding conditions in the Amazon during the dry season to encourage the fish to spawn. They lowered the water level and left it for a few hours before topping the tank up with cold water, and repeated the process until the pair was ready to lay their eggs. Buckley also collected samples of the orange mucus from the fish's flanks before they spawned and at various stages after the eggs had hatched, and monitored the parent's behaviour as their offspring grew.

During the first 3 days after hatching, the fry remained attached to the cone where the parents laid their eggs, absorbing the yolk and gaining strength until all of the fry were able to swim independently. Then they left the cone en masse and began feeding on their parents' mucus, feeding for up to 10-min by biting at the parent's side until the parent expertly 'flicked' the shoal over to its partner to continue feeding. The parents diligently fed their young intensely for 2 weeks. However, 3 weeks after hatching the parents' behaviour began to change as they started swimming away from their young for brief periods. At the same time the fry began biting their parents less and investigating other food sources. By the fourth week the parents were actively swimming away from their brood for the majority of the time and the fry barely bit them at all.

'There are a lot of parallels between the discus fish's parental care and the parental care that we see in mammals and birds,' says Buckley. Initially the parents invest all of their effort in raising their current batch of young, but wean the offspring when their investment in the current brood might begin affecting later broods. Buckley suspects that he sees signs of the conflict often seen between mammals and their young – where parents want to wean their offspring and the offspring continue pursuing them – in the fish's chasing behaviour during the third week after hatching.

Monitoring the composition of the parents' mucus before they spawned and through to the end of their parental responsibilities, Buckley found a huge increase in the mucus's antibody and protein levels when the parents laid their eggs, similar to the changes seen in mammalian milk around the time of birth. The protein and antibody levels remained high until the third week and returned to pre-spawning levels during the fourth week after hatching. Buckley suspects that the sudden increase in protein levels at spawning is hormonally regulated, much like the changes in mammalian milk, and is keen to find out more about the

hormones that regulate the fish's mucus supply as they care for their young.

More information: Buckley, J., Maunder, R. J., Foey, A., Pearce, J., Val, A. L. and Sloman, K. A. (2010). Biparental mucus feeding: a unique example of parental care in an Amazonian cichlid. *J. Exp. Biol.* 213, 3787-3795. <http://jeb.biologists.org/cgi/content/abstract/213/22/3787>

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