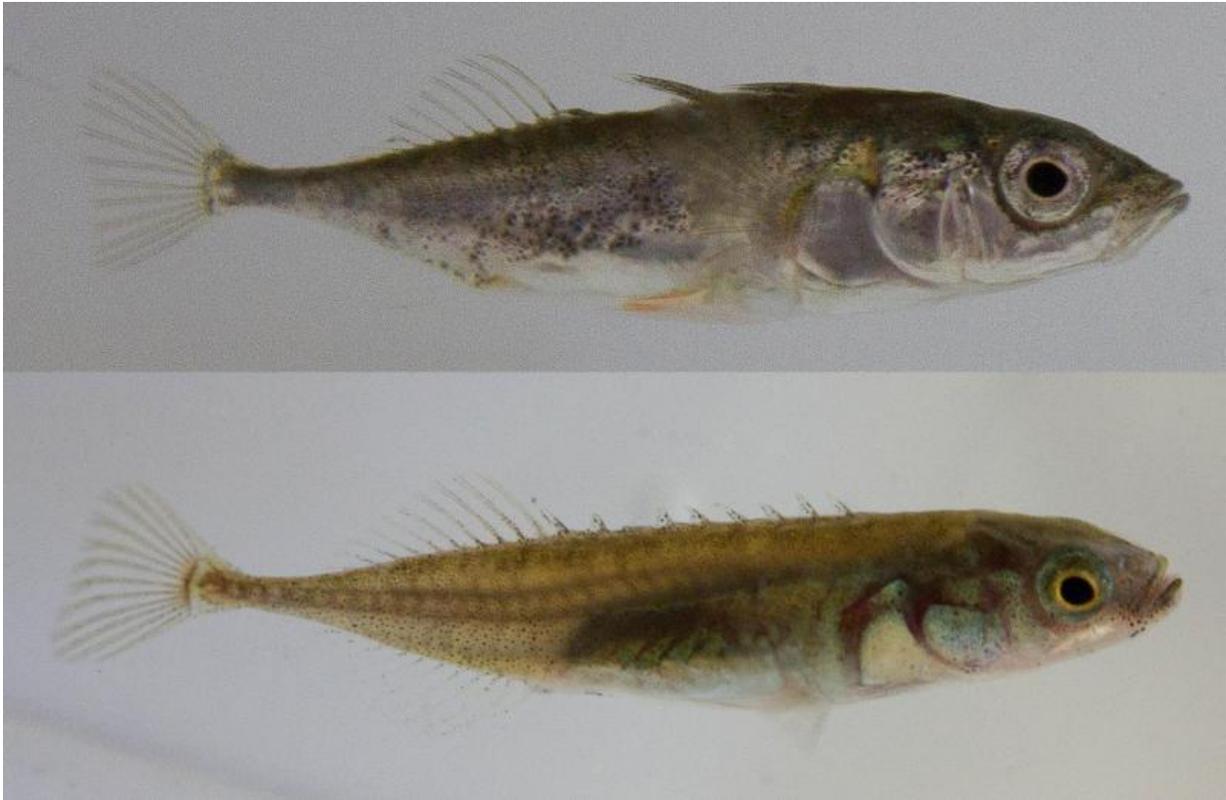


Fish bond when they eat the same food

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Sticklebacks

Similar-smelling chemical cues could explain why some animals choose to live together with other species, according to new research from scientists at the University of Lincoln, UK.

Published in the scientific journal *Behavioural Ecology and Sociobiology*,

the research found that for some [fish](#) it makes more sense to swim around with those that share their taste in food – and smell similar in the process – than to shoal with members of their own [species](#). The findings highlight the role that chemical cues might play in creating familiarity and group bonds between members of different species.

Led by Tanja Kleinhappel, a PhD researcher in the School of Life Sciences at the University of Lincoln, the study is the first to group members of different free swimming shoals of fish together to investigate how bonds between different species form.

The research team caught a number of three-spined sticklebacks (*Gasterosteus aculeatus*) and nine-spined sticklebacks (*Pungitius pungitius*) from local rivers and streams. In nature, these two species live side by side, yet individuals are also known to shoal together. The Lincoln team carefully planned what individual fish ate, and the groups into which they were placed.

Some groups contained members of both species that ate different types of food. In such cases, three-spined sticklebacks were most likely to associate with other fish with which they shared a diet – irrespective of the species their new-found friends belonged to. When all individuals in a group were fed on the same diet, the three-spined sticklebacks showed no particular preference to be with members of their own species.

Tanja explained: "This behaviour is most likely mediated by the general familiarity of diet-derived chemical cues, as the fish were previously housed in different tanks and were unfamiliar to one another. We don't believe that the observed shoaling behaviour of the fish is controlled by visual or other non-dietary cues that are specific to a particular species, and the results therefore suggest the general familiarity of shared [chemical cues](#) could be a way by which to induce shoaling behaviour between fish of the same and different species."

The researchers believe that free [amino acids](#) (the building blocks of cells, tissue and muscle) may form part of the chemical cue that the fish are picking up on. Previous research has shown that free amino acids in the skin mucus of fish are very similar to those found in their food.

Further experimental work is now needed to establish whether free amino acids indeed help individual fish to decide which others they want to associate with, but these initial findings may help our understanding of the underlying mechanisms that enhance social learning and information transfer.

Tanja added: "Associating with fish that smell the same might be all about food and protection. By associating with others that share the same preference for particular types of food, a fish ensures that it has enough to eat. Being surrounded by similar-smelling fish also protects an individual against predators that use certain chemical search patterns to detect prey."

More information: Tanja K. Kleinhappel et al. A mechanism mediating inter-individual associations in mixed-species groups, *Behavioral Ecology and Sociobiology* (2016). [DOI: 10.1007/s00265-016-2099-x](#)

Provided by University of Lincoln

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