# Oh brother, where art thou? Sticklebacks prefer to be with relatives

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Three-spined stickleback (Gasterosteus aculeatus). Credit: Joachim Frommen

Many animals are able to discriminate between related and unrelated individuals but how they do so has proven remarkably difficult to understand. Joachim Frommen and colleagues at the University of Veterinary Medicine, Vienna have investigated the issue using the three-spined stickleback and its shoaling preferences as a model system. It

turns out that the fish prefer kin to unrelated conspecifics, regardless of how familiar they are with individual shoal members. The results indicate that level of familiarity does not affect the stickleback's ability to recognize kin. Recognition based on phenotype matching or innate recognition thus seems to be the overruling mechanism when it comes to choosing members of a peer group.

Numerous species, from microbes to humans and even plants, are able to distinguish relatives from others of their kind. However, it has proven remarkably difficult to uncover the underlying mechanisms. When family members remain together for life, it is likely that recognition of relatives is based on familiarity. But how do animals recognize kin if they do not live in family groups? One possible way of recognizing relatives may be "phenotype matching", in which individuals compare traits such as looks or scent of relatives with whom they are familiar to those of unknown conspecifics: shared genes can give rise to similar phenotypes. But distantly related individuals, such as those that share a genetic ancestor, may look or smell similar although they are not close relatives. Phenotype matching may thus not always be a reliable method to distinguish relatives from mere acquaintances.

## Getting together with family and friends

The three-spined stickleback (Gasterosteus aculeatus) is known to be able to recognize both familiar and unfamiliar kin. When not breeding, juvenile and adult sticklebacks tend to gather in loose groups and seem to prefer the company of close relatives to that of "strangers". Many fish species are known to associate in groups, or shoals, the composition of which might be influenced by familiarity and relatedness. Swimming in a shoal generally minimizes the chances that an individual fish will be eaten by a predator. Forming a group of relatives thus protects not only the individual but also the family group as a whole, thereby improving the family´s chances of survival.

# Recognizing cues about relatedness

To investigate the preference for joining a certain shoal, Joachim Frommen and his colleagues at the Konrad Lorenz Institute of Ethology exposed a number of individual sticklebacks to two shoals, one of siblings and one of strangers. In each case, the test fish was free to select which shoal to join. The "stranger group" was comprised of unfamiliar individuals only, while in some tests the "sibling group" was comprised of familiar siblings and in others of unfamiliar siblings. The researchers found that the test fish preferred to join the "sibling group" irrespective of whether it was familiar with the siblings. In a second experiment the fish were given the choice between groups of familiar and unfamiliar kin. Surprisingly, no preference could be detected. The results show that the preference for kin is not determined by familiarity, at least in this species. "It seems that the fish learn early in life to recognize cues of closely related group members such as olfactory cues and they infer kin status from these cues whenever they meet conspecifics. Whether they have met the individual conspecifics before has only a minor role", says author Joachim Frommen.

**More information:** Frommen, J. et al. Investigating the Effect of Familiarity on Kin Recognition of Three-Spined Stickleback (Gasterosteus aculeatus), *Ethology* (Vol. 119, pp. 531-539) and is available online. onlinelibrary.wiley.com/doi/10.1111/eth.12091/full

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