

Parasitic infection may have spoiled zebrafish experiments

Common contaminant may change shoaling behaviour, a proxy for stress and anxiety in behavioural studies.

Petra Szilagyí

29 July 2016



O. LOUIS MAZZATENTA/NGC

A parasitic infection lurks within many populations of zebrafish.

A common parasite that infects laboratory zebrafish may have been confounding the results of years of behavioural experiments, researchers say – but critics say the case isn't proven.

Like the rat, the zebrafish (*Danio rerio*) is used in labs worldwide to study everything from the effects of drugs, to [genetic diseases](#) and disorders such as schizophrenia and autism. Since both zebrafish and people are highly social, researchers think that zebrafish may be a better lab model for some human behaviours than rodents.

Zebrafish demonstrate their preference for each other by clustering into shoals – a social behaviour that researchers measure when they want to test how drugs affect zebrafish stress and anxiety levels, as a [proxy for potential human responses](#). But this behaviour can change when fish are infected with a neural parasite called *Pseudoloma neurophilia*, scientists from Oregon State University in Corvallis report in a paper published on 11 July in the *Journal of Fish Diseases*¹.

The team say that individual fish infected with *P. neurophilia* swim closer to each other than do non-infected fish, a behaviour that is also associated with increased stress and anxiety. The finding casts doubt on results from previous experiments, says lead study author Sean Spagnoli, a veterinary surgeon – since the infection may have scrambled researchers' interpretations of shoaling behaviour.

Ghost in the machine

Spagnoli first heard that a parasite was infecting many laboratory zebrafish when he was working at the Zebrafish International Resource Center (ZIRC) in Eugene, Oregon – a central repository which sends out zebrafish strains to researchers and also tests zebrafish health. *P. neurophilia* settles in the brain, spinal cord and nerves of zebrafish.

“The paper is great, as it raises some doubts about the way behaviour may be used to study brain function in zebrafish,” says Robert Gerlai, a behavioural geneticist from the University of Toronto Mississauga in Canada. But he advises not jumping to conclusions on the basis of one study. Gerlai has concerns about the work; in particular, he says, Spagnoli's team relied on a low-tech method to

measure their fish shoals, taking screen snapshots and measuring the distance between each fish rather than more precise continuous tracking. And the researchers didn't check what else might have been affecting the zebrafish, he adds.

Elena Dreosti, a geneticist at University College London, says that the paper's data are weak and the effects it shows are small. "Considerable additional work is needed to know if this is likely to have a significant impact on the type of behaviour research that is done by the community working with zebrafish," she says.

But Spagnoli says that his low-tech method is all that's needed to raise the red flag that infection can influence behaviours such as shoaling. He agrees that he hasn't proven that the *P. neurophilia* is directly responsible for the changed behaviour – but says that his study suggests that shoaling changes when the parasite is present.

Contamination problem

As many as half of all laboratory facilities may be using some infected zebrafish, according to ZIRC data from 2015 – although only 28 facilities submitted their zebrafish to the centre for health checks that year. Within a facility, infection rates hover around 7-10%; some tanks may have no infected zebrafish, but others have many, Spagnoli says.

Nuno Pereira, a zebrafish veterinarian at the Gulbenkian Science Institute in Oeiras, Portugal, says that most researchers are already aware of the importance of testing for the parasite – and Spagnoli agrees that labs have drastically improved their screening protocols.

But Spagnoli thinks that many labs may still have a significant number of fish that are infected. "I haven't seen a single paper that stated that 'fish used were certified pathogen-free for *P. neurophilia*,'" he says. The team will continue to study the parasite's effects, he says, and is also looking at the potential influence of another common contaminant, *Mycobacterium chelonae*, on shoaling behaviour.

Nature | doi:10.1038/nature.2016.20308

References

-
1. Spagnoli, S., Sanders, J. & Kent, M. L. *J. Fish Dis.* <http://dx.doi.org/10.1111/jfd.12512> (2016).