EXPERIMENTAL ORGANISMS

Swab the fish: refining DNA collection

Tilley, C.A., et al. *Sci Rep* **10**, 18212 (2020)

Most fish don't like to find themselves out of water, but out they must (briefly) come for various reasons. Should you need to remove your zebrafish or sticklebacks from their home tanks for genotyping, research led by William Norton at the University of Leicester suggests a swab.

Fin clipping has long been the preferred means of DNA sampling for the scientists and technicians involved, but fish may be less fond of the procedure. "There have been studies to suggest that zebrafish don't really like fin clipping," says Norton. "We have good reasons to think that this is uncomfortable." After they wake up from the anesthetic applied — small chunk of caudal tail missing — fish may be left a little anxious, with elevated cortisol levels, decreased appetites, and a tendency to hug the bottom of their tanks. With the numbers of fish used in research rising, gaps remain as to what's best for their welfare. "It's been understudied compared to rodents," says Norton.

Interested in a less-invasive means of identifying different fish, two of Norton's technicians, Carl Breacker and Ceinwen Tilley, looked to aquaculture, where swabbing for DNA has been readily used in larger species, such as trout and salmon, for some time. In 2017, the Norton lab showed the approach could be successfully adapted to the [smaller lab species](#). Overall timing is about the same as clipping, Norton says — extracting the DNA takes a little longer from the swab, but the un-anesthetized fish can be back in their tanks while that occurs, rather than in recovery.

Writing in *Scientific Reports*, the team has now compared swabbing to clipping from the fishes' perspectives. "Anytime you net [a fish] and put it in another tank, the fish isn't too happy," says Norton. "But swabbing is less bad for the fish in some significant ways." Notably, swabbed zebrafish and sticklebacks released less cortisol, showed fewer behavioral changes, and had less activation of a number of stress axis marker

genes than fin-clipped animals; the data were also less variable among swabbed fish. "We think we can use less animals if we collected DNA by swabbing," says Norton, noting too that lab personnel prefer swabs to scalpels.

As countries in Europe consider fin clip bans there are still some considerations, such as the importance of the mucous that is being removed by the swab. "That's actually very important for the fish to keep out bacteria and pathogens," says Norton. "We want to quantify the amount of mucous we've removed and then see how quickly that recovers." The lab is also exploring whether the analgesic lidocaine could refine the swabbing procedure further, as well as why some fish are just more susceptible to stressors than others.

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