

Aggressive piranhas bark to say buzz off

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Thanks to Hollywood, piranhas have a bad reputation and it would be a brave scientist that chose to plunge their hand into a tank of them. But that didn't deter Sandie Millot, Pierre Vandewalle and Eric Parmentier from the University of Liège, Belgium. 'You just have to pick them up and they make sounds,' says Parmentier. However, it wasn't clear when and why piranhas produce sounds naturally. Intrigued by fish acoustic communication and the mechanisms that they use to generate sound, the team monitored the behaviour of small groups of captive red-bellied piranhas and publish their discovery that the fearsome fish have a repertoire of three combative sounds in *The Journal of Experimental Biology*.

Suspending a hydrophone in the piranhas' tank, Millot and Parmentier recorded the fish's sounds and filmed them as they cruised around and competed for food. According to Parmentier, the well-fed fish were relatively peaceful – attacking each other occasionally – although they were not averse to nipping at near-by fingers. 'We both visited the hospital because we were bitten and Sandie's finger was nearly cut in half,' recalls Parmentier.

Comparing the soundtrack with the movie, the team found that the fish were generally silent. However, they became quite vocal as soon as they entered into a confrontation – producing the same barking sound that they had produced when held in the scientists' hands. 'At first we thought there was only one sound,' admits Parmentier, but then it became apparent that the piranhas produce two more: a short percussive drum-like sound when fighting for food and circling an opponent; and a softer

'croaking' sound produced by their jaws when they snap at each other.

Having convinced themselves that the fish had a wider acoustic repertoire than they had initially thought, the team decided to find out how the fish produce the sounds.

Parmentier explains that piranhas were already known to produce noises using muscles attached to their swim bladders; however, it wasn't clear how the swim bladder was involved in sound production. So, the team stimulated the muscles to contract, measured the swim bladder's vibration and found that instead of resonating – and continuing to vibrate after the muscles ceased contracting – the swim bladder stopped vibrating as soon as the muscles finished contracting. In other words, the muscles were driving the swim bladder's vibration directly and the frequency (pitch) of the bark and drum sounds was determined by the muscles' contraction frequencies: not the swim bladder's own intrinsic resonant properties. They also found that the rear half of the swim bladder did not vibrate, so only the head portion of the swim bladder contributed to [sound](#) production.

Now that they have discovered that aggressive piranhas are quite vocal, the team is keen to find out whether amorous piranhas are vocal too. However, Parmentier suspects that the team will have to relocate to Brazil to answer that question. 'It is difficult for the [fish](#) to reproduce in the tank, so I am sure we have to deploy hydrophones in the field to have the sounds that are produced during mating,' says Parmentier.

More information: Millot, S., Vandewalle, P. and Parmentier, E. (2011). Sound production in red-bellied piranhas (*Pygocentrus nattereri*, Kner): an acoustical, behavioural and morphofunctional study. *J. Exp. Biol.* 214, 3613-3618. <http://jeb.biologists.org>

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