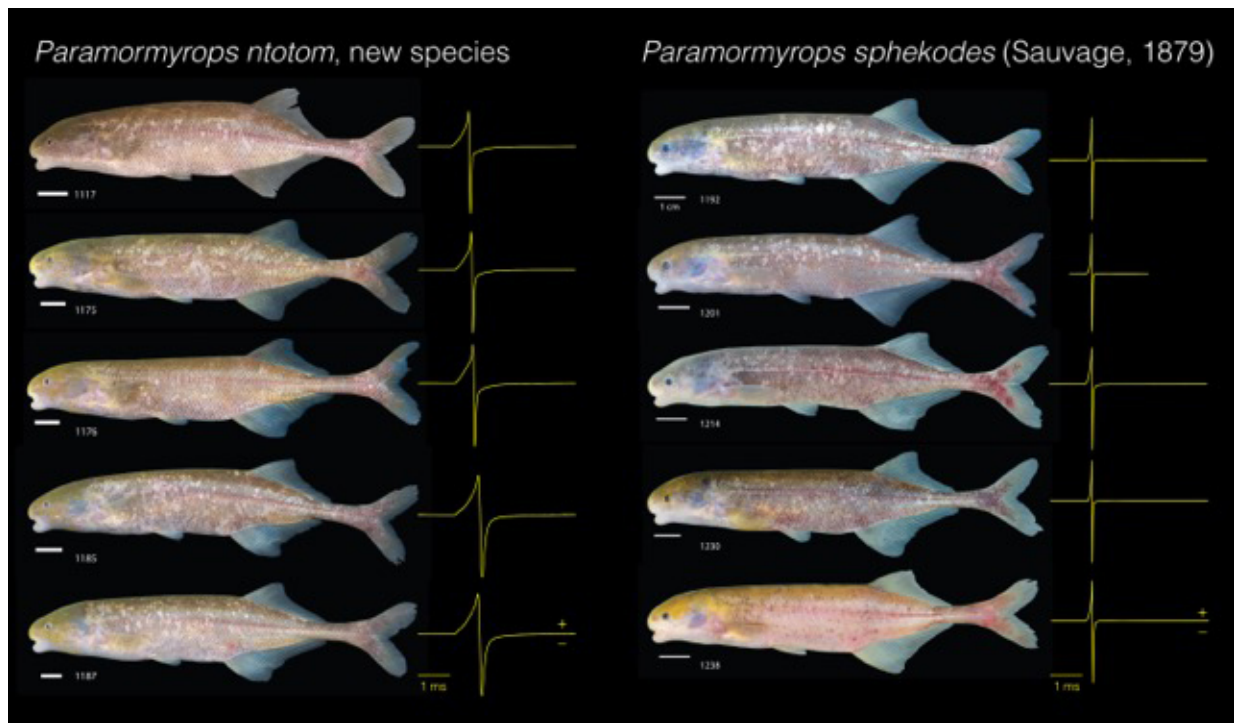


Mystery of electric fish genus solved, new species identified

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Comparisons of *Paramormyrops ntotom* and *P. sphekodes* specimens, showing how the body measurements and EOD waveforms differ. *P. sphekodes* has a slightly smaller body, shorter head and shorter EOD than *P. ntotom*. Credit: John Sullivan/Provided

Solving a 140-year old taxonomic puzzle, Cornell researchers have identified and described a new species of electric fish from the Ogooué

River in Gabon, Africa.

The [new species](#), named *Paramormyrops ntotom*, belongs to the family Mormyridae, and is part of a group called a "[species flock](#)" – closely related species that are similar in appearance and all live in the same region.

The researchers, who published their results May 2017 in the *Zoological Journal of the Linnean Society*, identified the new species through anatomical measurements, genetics and analyses of the weak electric pulse the fish emit called an electric organ discharge, or EOD. These data helped distinguished *P. ntotom* from another previously described fish that belongs to the same genus and species flock, called *Paramormyrops sphekodes*, which was first described in 1879.

A French explorer first identified *P. sphekodes* after collecting two specimens in 1877 near the village of Doumé, which lies along the Ogooué River. Those specimens, which serve as a reference for the species, are preserved in the National Museum of Natural History in Paris, but are too degraded to properly analyze. Because other related species in the genus *Paramormyrops* so closely resembled *P. sphekodes*, they have been incorrectly classified as *P. sphekodes* since the late 1800s.

"*P. sphekodes*, described in 1879, was the first of what we now know are many species in this genus," said John Sullivan, a co-author on the paper and curatorial affiliate at the Cornell Museum of Vertebrates. "It being the first, when people collected other ones later they just applied the *P. sphekodes* name to those specimens, but a lot of them clearly are not the same thing. It was never very clear how to distinguish this one from the others. In this study, we do that for the first time."

In order to solve the mystery, Sullivan returned to the original site (called

a type locality) near Doumé where the reference or type-specimens for *P. sphekodes* were caught in the 1800s. There, and in another location along the Ogooué River 45 kilometers away, Sullivan used fish traps to catch new specimens during two expeditions, in 2011 and another in 2014 sponsored by The Nature Conservancy.

Among the *Paramormyrops* fish Sullivan collected, one variety had a short EOD, while the other had a longer one, a difference revealed by an amplifier with two electrodes placed in the water.

From these fresh samples, Sullivan and his colleagues – co-author Carl Hopkins, professor emeritus of neurobiology and behavior, and first author Madeline Rich, an undergraduate in Hopkins' lab – used modern techniques to study the fish.

Rich made anatomical measurements from the bodies and also from X-rays of the newly caught fish at the Cornell University Museum of Vertebrates. The measurements showed that there were subtle differences in mean body size and head proportions. At the Fuller Evolutionary Biology Lab in the Cornell Lab of Ornithology, Rich also obtained DNA sequences of the fish that offered evidence that the two fish varieties do not interbreed.

By comparing head measurements with the 1879 reference specimens, the researchers were able to distinguish *P. sphekodes* – which had a shorter EOD and a smaller body and shorter head – from a new species, *P. ntotom* (*ntotom* is a word from the Fang language of Gabon that means "mormyrid fish").

"This is a great example of bringing diverse kinds of data together to solve a difficult taxonomic question," said Hopkins. "It really demonstrates the usefulness of revisiting type localities and recording EODs for mormyrid fish taxonomy."

They were able to re-describe *P. sphekodes*, while also creating a framework for distinguishing species belonging to the *Paramormyrops* genus.

More than 200 known species of mormyrid fish live in fresh waters across Africa, and their EODs are unique to each species. The [fish](#) use them to communicate species identity, as well as sex identity in some species where males and females have different EODs. The pulses also help them electrolocate, or navigate, as special tail sensors pick up distortions caused by nearby objects within their self-produced electric fields.

More information: Madeline Rich et al. Rediscovery and description of *Paramormyrops sphekodes* (Sauvage, 1879) and a new cryptic *Paramormyrops* (Mormyridae: Osteoglossiformes) from the Ogooué River of Gabon using morphometrics, DNA sequencing and electrophysiology, *Zoological Journal of the Linnean Society* (2017). [DOI: 10.1093/zoolinlean/zlw004](https://doi.org/10.1093/zoolinlean/zlw004)

Provided by Cornell University

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