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Report on an Oomycete Infection (Heterokontophyta: Oomycota) in Northern Studfish, *Fundulus catenatus* (Fundulidae) from Tenmile Creek, Saline County, Arkansas

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Running Title: Oomycete Infection in *Fundulus catenatus*

Cases of oomycete (water mold) infestations in fishes are relatively common (Schäperclaus 1986). Indeed, among recent emerging infectious diseases responsible for severe population declines in fish taxa, fungal and oomycete microbes have emerged as significant contributors (Gozlen et al. 2014). In addition, the oomycetes negatively impact a wide array of other taxa including insects, zooplankton, nematodes, crayfish and amphibians (Phillips et al. 2008, Beakes et al. 2012; Sarowar et al. 2014). We are not aware of any previous reports of an oomycete infection in native fishes of Arkansas. Here, we document a noteworthy oomycete infestation in Northern Studfish, *Fundulus catenatus* Storer from central Arkansas.

Fourteen adult *F. catenatus* (mean \pm 1SD total length [TL] 69.9 \pm 7.6, range 62-93 mm) were collected with a backpack electrofisher on 15 November 2015 from Tenmile Creek off US 70, vicinity of Lonsdale, Saline County (34.545463°N, 92.753702°W). Specimens were placed in creek water and taken to the laboratory within 24 hr for processing. Fish were killed by immersion in a concentrated chlorotone solution and measured for TL. Two (14%) of the *F. catenatus* (70 and 76 mm) were noted of having a moderate growth of what appeared to be unknown white cotton wool-like patches on a small part of their body (head and chin) (Fig. 1). This growth was sampled by removing a portion with fine forceps, placed on a microscopic slide, stained with bromphenol cotton blue, and mounted with a coverslip. The slide was examined under a light microscope and photomicrographs were obtained. Voucher specimens of *F. catenatus* are deposited in the Henderson State University (HSU) collection, Arkadelphia.

Although it was not possible with confidence to determine with certainty which genus is present in this case without culturing and DNA sequence data, microscopic examination of the infestation revealed

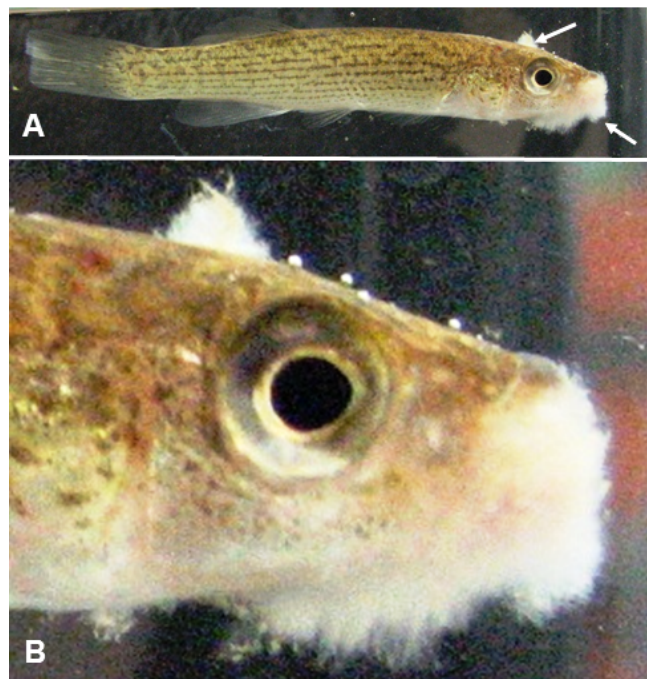


Figure 1. Infected *Fundulus catenatus* (TL = 76 mm). A. Oomycete growth (arrows) on top of head, mouth and chin. Note that there appears to be no other growth on remainder of body. B. Close-up of same showing filamentous mycelia growing on the mouth and underside of chin with smaller colonies on top of head.

non-septate, multinucleate and unbranched or branched hyphae (Fig. 2) similar to those of the water mold (Oomycetes) Saprolegniales species (Webster and Weber 2007). The best-studied fish pathogenic oomycetes belong to this order including the genera *Achlya*, *Aphanomyces* and *Saprolegnia*. Organisms in this order reproduce asexually by releasing biflagellated spores formed in apical slightly swollen sporangia (Schäperclaus 1986, fig. 236).

Numerous other fishes collected on the same date at the Tenmile Creek site did not harbor any similar infestation, including *Camptostoma spadiceum*, *Gambusia affinis*, *Lepomis cyanellus* and *Noturus*

lachneri. In addition, we have, over the last 40+ yr, collected many fishes from all river drainages in the

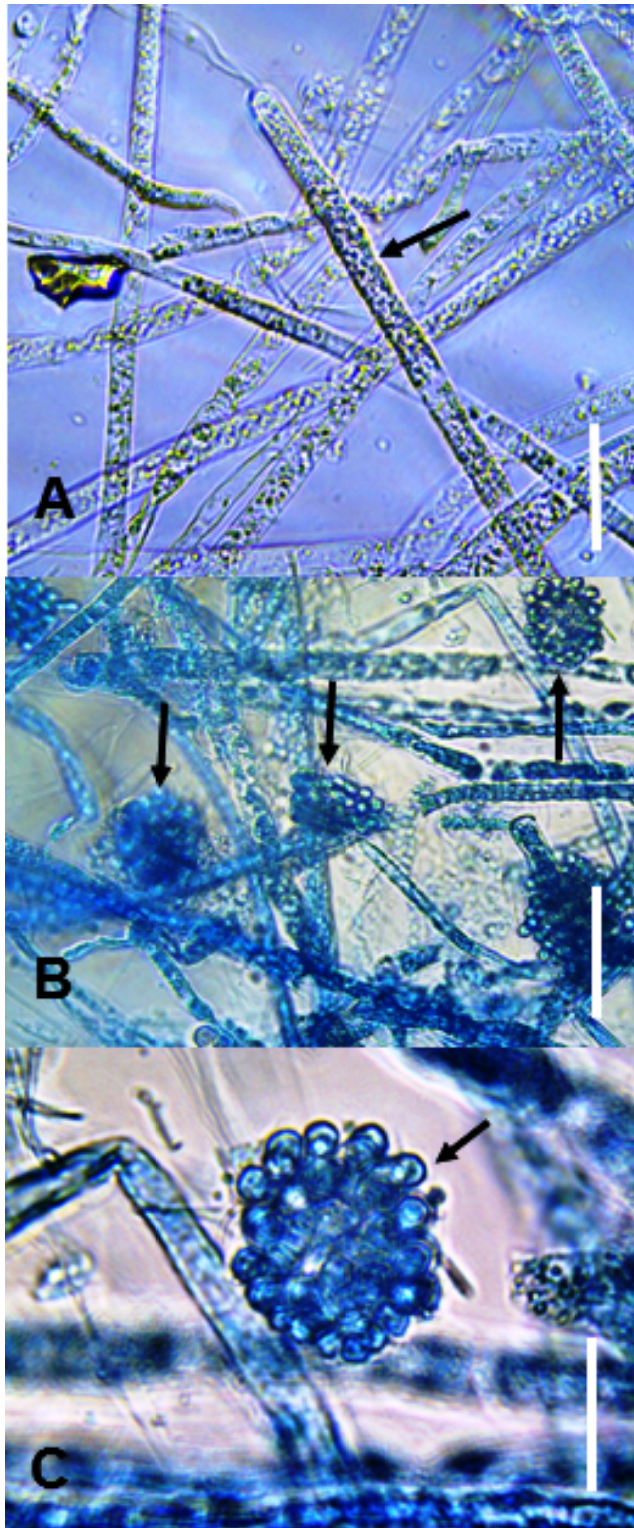


Figure 2. Oomycete infection in *Fundulus catenatus*. A. Unstained non-septate hyphae (arrow); scale bar = 50 μ m. B. Three balls of encysted zoospores (arrows); scale bar = 50 μ m. C. Single zoospore ball (arrow); scale bar = 25 μ m. B & C stained with bromphenol cotton blue.

state and never recall seeing such a similar infection on a single fish. Therefore, we suggest this is a fairly rare event and it does not appear to pose a serious risk as a potential pathogen on Arkansas fish populations.

We document the first report of an oomycete infection in a native Arkansas fish species. Additional research on this topic, including molecular studies, will surely extend our knowledge and further hosts could be discovered having similar infestations in the state.

Acknowledgments

The Arkansas Game and Fish Commission issued a scientific collecting permit to CTM. We thank Dr. R. Gozlen (IRD, Paris, France) for information on oomycete infections in fish, Dr. R. Tumlison (HSU) for expert curatorial assistance, and the McAllister clan for help in collecting at Tenmile Creek.

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