



Short communication

First record of *Polypodium hydriforme* (Cnidaria) from lake sturgeon (*Acipenser fulvescens* Rafinesque) in the St. Clair River, Michigan

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Polypodium hydriforme (Ussov 1885, 1887) (Cnidaria) is a common parasite of acipenserids from large rivers in Russia (Dogiel, 1940; Raikova et al., 1979; Raikova, 1994, and references listed therein). Raikova (1994) summarized the known information on the biology and life cycle of *P. hydriforme*. In North America, *Polypodium* sp. has been reported from the eggs of paddlefish *Polyodon spathula* from the Ossage River, Missouri (Suppes and Meyer, 1975); from the eggs of the shortnose sturgeon *Acipenser brevirostrum* from the St. John River, Canada (Dadswell et al., 1984); from the eggs of lake sturgeon *Acipenser fulvescens* from the Nelson River, Manitoba and from Cumberland House, Saskatchewan (Dick et al., 1991); and from the eggs of the white sturgeon *Acipenser transmontanus* from the Davis River, California [M. Kent, pers. comm. to E. V. Raikova (Raikova 1994)]. Raikova et al. (1979) provided evidence that the American form of *Polypodium* is probably *P. hydriforme*.

In 1970, the eggs from a ripe *A. fulvescens* from the Black River near Cheboygan, Michigan were found infected with *P. hydriforme* (see Hoffman et al., 1974). In May 1973, one egg from over 1000 eggs was found infected in another lake sturgeon from the same locality. Historically, lake sturgeon could move freely between the Black River and Lake Huron, but dam construction in the early 1900s effectively blocked fish passage (Smith and Baker, 2005). Since 1973, sturgeon infected with *P. hydriforme* have not been reported from Michigan.

The St. Clair River, Michigan supports a population of free-ranging lake sturgeon with open access to the waters of Lake Huron and Lake Erie (Thomas and Haas, 2002). Since 1997, the Michigan Department of Natural Resources (MDNR) has conducted an annual survey of the lake sturgeon population in the St. Clair River. The survey period often overlaps with the sturgeon spawning period in the St. Clair River and a few ripe sturgeon are captured each year. During the 2008 lake sturgeon survey, employees of the MDNR noticed 'organisms' associated with the eggs of one ripe sturgeon. On further examination, these organisms were identified as *P. hydriforme* based on the information presented by Raikova et al. (1979). The present study reports on the occurrence of *P. hydriforme* in the lake sturgeon *A. fulvescens* from the St. Clair River, Michigan, based on examination of living sturgeon captured during the 2008 MDNR sturgeon survey.

Lake sturgeon were caught on setlines in the North Channel of the St. Clair River near Algonac, Michigan (lat/long, 42.619645–82.529969) between 3 and 18 June 2008. Details of the setline methodology are provided in Thomas and Haas

(1999). Mean total length (mm) and weight (kg) of examined fish were 1103 (range 602–1613, standard error = 28.8) and 9.8 (range 0.7–30.4, standard error = 0.78), respectively. Each fish was examined for sex products by manual massaging of the abdomen using an anterior to posterior motion. Detection of *P. hydriforme* was based on gross visual examination of eggs and of material extruded from the vent of the living sturgeon. Mature stolons of *P. hydriforme* are deposited in the USNM Helminthological Collection, USDA, Beltsville, Maryland, as USNM 101001.

During the 2008 MDNR survey, 97 lake sturgeon were captured; the sex of only four fish (2 females; 2 males) could be determined, as they were the only fish to exude gametes when examined. The sex of the other 93 fish was not determined, except for one sturgeon that was infected with *P. hydriforme* and considered to be a female based on the presence of the egg-infecting cnidarian. Two female lake sturgeon (67%) of three females positively sexed were infected with *P. hydriforme*, or 2% of a total of 97 fish examined. One infected female was ripe when examined and extruded eggs. When the other female was examined, no eggs were extruded, but *P. hydriforme* was expelled.

Among the normal eggs expelled by the single ripe female were abnormally large and discolored eggs. We suspect that these eggs, gray or marbled light and dark in color, were infected with the stolons of *P. hydriforme* (Fig. 1), consistent with the description of Raikova (2002) for infected ova. Mature *P. hydriforme* stolons and sturgeon eggs from this female were collected (Figs 2 and 3), along with stolon from the other infected fish without eggs, which we assume was also a female.

The study of *P. hydriforme* in living sturgeon from the St. Clair River is problematic for at least two reasons. First, ripe female sturgeon are infrequently collected during MDNR surveys. Only 21 ripe females out of 1111 sturgeon have been collected since the MDNR survey began in 1997. Second, when sturgeon were massaged to check for gametes, feces were often ejected from the vent of many of the fish. This material is often dark and coarse, with crushed dreissenid mussels, sand, and other materials. It is probable that *P. hydriforme* was undetected in lake sturgeon from the St. Clair River in the past, due to the rarity of handling ripe females and complicated by the fecal material. Thus, it is difficult to compare *P. hydriforme* prevalence in St. Clair River sturgeon to that of other prevalence studies in North America. Furthermore, our study was based on the examination of eggs and other materials

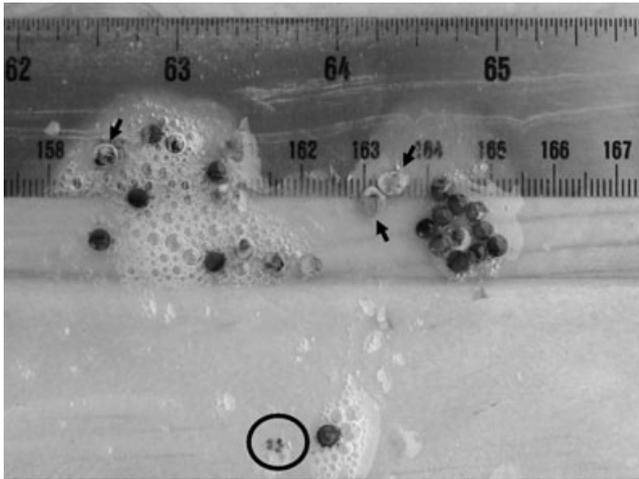


Fig. 1. Normal black eggs, abnormal eggs (black arrows), and mature stolons of *P. hydriforme* (inside black circle) from St. Clair River lake sturgeon (*A. fluvescens*). Abnormal eggs suspected to contain mature stolons

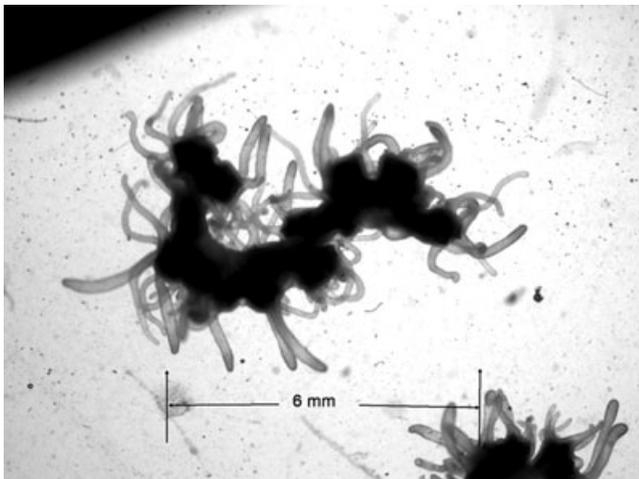


Fig. 2. Mature stolon of *P. hydriforme* with everted tentacles, from St. Clair River lake sturgeon (*A. fluvescens*)

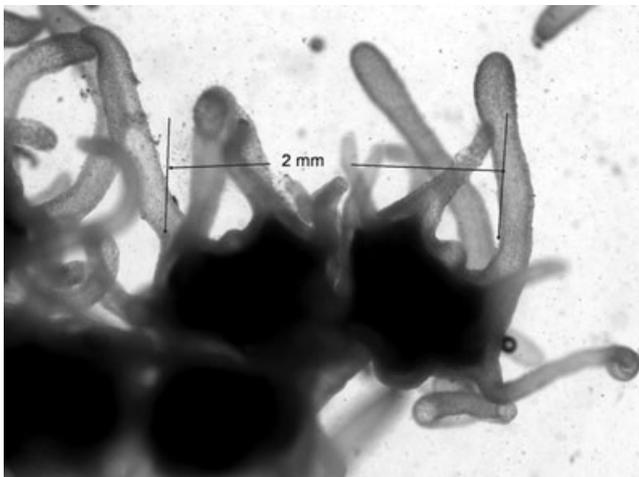


Fig. 3. Close-up of a portion of *P. hydriforme* stolon with everted tentacles, from St. Clair River lake sturgeon (*A. fluvescens*)

expressed from living sturgeon as compared to other studies that examined gonads from sacrificed sturgeon.

Impact of *P. hydriforme* on the reproductive success of lake sturgeon in the St. Clair River is unknown. If a high percentage of females were infected and a high percentage of the eggs of individual fish parasitized, then the reproductive potential of the population could be compromised. However, we do not believe this has occurred, because there has been evidence of consistent recruitment from this population over the past 20 years (Thomas and Haas, 2002).

Based on published reports of *P. hydriforme* occurrence in North America, this cnidarian species has an extremely large range but appears to be infrequently reported. It is possible that fisheries biologists and investigators have not detected it in their studies for the various reasons discussed above. To our knowledge, this is the sixth published report of *P. hydriforme* from acipenserids in North America, and the only report from a free-ranging population of Great Lakes lake sturgeon.

Acknowledgements

The 2008 sturgeon survey on the St. Clair River by the Michigan Department of Natural Resources was funded by the Federal Aid in Sport Fish Restoration Act.

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