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THE HABITAT OF *APHREDODERUS SAYANUS* IN
KALAMAZOO COUNTY, MICHIGAN

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The first published note of the occurrence of the pirate perch (*Aphredoderus sayanus*) in Michigan was made by Bollman,¹ who recorded "two specimens taken in a small brook which flows into Howard Lake." Although the several small streams (only a few rods in length) which are tributary to this lake have often been examined by the writer, they have never yielded *Aphredoderus*. *Eucalia inconstans*, in contrast, lives here in great abundance.

Aphredoderus sayanus is, however, a common fish in two streams flowing from the north into Black Lake, immediately north of Howard Lake. The larger (more easterly) of these two brooks rises little more than two miles from the lake in a level oak country. Although but a small ditch for most of its length, in its last third of a mile it expands into a gentle

¹ *Bull. U. S. Fish Comm.*, 8, 1888 (1890), p. 223.

meandering stream six to fifteen feet in width, seldom more than three feet deep except in high water, and with a current flowing at the rate of twenty-five feet per minute. In mid-stream, the water here is practically free from vegetation, but for a quarter of a mile from the lake both banks show a profuse growth of water cress, together with small patches of peppermint (*Impatiens biflora*), *Scutellaria lateriflora*, *Iris versicolor* and *Mimulus jamesii*. Close to the lake the banks become impassably boggy, with growths of cat-tail (*Typha latifolia*), swamp loosestrife (*Decodon verticillata*), Sparganium and swamp dock (*Rumex brittanica*). The bottom of the stream remains firm and sandy to its entrance into the lake.

Aphredoderus is not found in the upper portion of this brook, where the water dashes over gravel—the habitat of the rainbow darter (*Poecilichthys coeruleus*). It is abundant however, in the lower quieter course of the stream. Here it is associated with an abundance of aquatic insects, amphipods and snails, and with twenty-four other species of fishes. These fishes are: *Amia calva*, *Catostomus commersonnii*, *Erimyzon succeta*, *Pimephales notatus*, *Semotilus atromaculatus*, *Notemigonus crysoleucus*, *Notropis cornutus*, *Nocomis kentuckiensis*, *Ameiurus natalis*, *Ameiurus mclasi*, *Umbra limi*, *Esox vermiculatus*, *Fundulus notatus*, *Eucalia inconstans*, *Labidesthes sicculus*, *Ambloplites rupestris*, *Chaenobryttus gulosus*, *Lepomis incisor*, *Eupomotis gibbosus*, *Micropterus salmoides*, *Boleosoma nigrum*, *Poecilichthys iozaci*, *Poecilichthys coeruleus*, *Microperca punctulata*.

The smaller tributary of Black Lake is three or four feet deep in its lower course. It has here a miry bottom covered in many places with a growth of *Chara* and *Elodea*,

and large patches of water cress occur on both banks. The liverwort *Riccia fluitans* forms a large part of the floating vegetation while *Marchantia* is found along the shore. Here mollusks are more plentiful than in the preceding stream; the same profusion of water bugs occurs here, and dragon fly nymphs are even more numerous.

Aphredoderus is abundant in this lower portion of the stream, living in the cress in company with *Umbra limi*, *Eupomotis gibbosus*, *Ameiurus*, sp., *Micropterus salmoides*, and *Eucalia inconstans*. It is more loosely associated here with *Notropis cornutus*, *Notemigonus crysoleucas* and *Pimephales notatus*, these species holding to the open water in midstream. Trout have been repeatedly planted in this brook, but none has been found during these investigations.

Farther upstream, where the surface becomes almost covered by cress and peppermint, *Aphredoderus* was not found.

Not all streams in the immediate vicinity of Black Lake contain pirate perches. In a large deep ditch near Updegrove Lake *Aphredoderus* is rare, but *Eupomotis gibbosus*, *Micropterus salmoides*, *Umbra limi*, and *Fundulus notatus* are abundant. A stream flowing into Red Lake is too sluggish for *Aphredoderus*; *Umbra limi* swarms beneath its duckweed covered surface. A brook tributary to a stream flowing into Barton Lake abounds with trout (*Salvelinus fontinalis*), *Umbra limi* and *Esox vermiculatus*, but *Aphredoderus* is absent.

Pirate perches are lowland fishes, in the region studied never being found far from large streams or lakes. They inhabit dense vegetation and avoid open water: over ninety per cent of the many specimens taken in this locality were

found beneath water cress or in masses of Chara. After the cress has been killed by the cold of winter, they still lurk in deep holes underneath the bank in company with *Umbra limi*, *Eupomotis gibbosus*, etc. They are distinctively bottom fishes.

The food of the pirate perch was found to consist of certain of the smaller invertebrates of its vegetation habitat, namely green midge larvae, small amphipods and sometimes the larvae of certain dytiscid beetles. Many stomachs have been found empty.

Pirate perches pass a considerable part of the time at rest: head upstream, the large dorsal expanded, the caudal partly closed and the pectorals slowly moving. When frightened they move swiftly; liberated in midstream they dive vertically downward to find a place of concealment.