

## MORE ON MADTOMS

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Historically, the concept of an ecological niche has taken on two forms. Traditionally, a niche was thought of as a property of the environment: an actual or potential situation which was capable of being exploited by a species as a means to that species' survival. A more recent idea, attributed to G. Evelyn Hutchinson, is that the niche is a property of the species.

Under this concept, an ecological niche is the multi-dimensional extent of environmental parameters within which a species may survive, less that from which it has been excluded by competition. The idea of a "vacant" ecological niche is incompatible with the latter concept. Nevertheless, the reader will understand what I mean by this idea: a "vacant ecological niche" is an ecological situation currently exploited by one or more species, which has the potential of being exploited more fully by the addition of more species in incomplete competition with the original assemblage.

The above discussion was provided to present the reader with the background to understand--partially, at least--the ichthyological situation as it currently exists in Massachusetts. Those familiar with geology will realize that some fifteen thousand years ago, there were no fish at all in Massachusetts, the reason being that the Commonwealth was covered by a mile or so of ice. Upon the retreat of the continental glacier, cold-water species of fish followed in its wake, easily able to traverse the network of glacial lakes and streams associated with glacial meltwater. The icy waters were no barrier to such species as the Lake Trout, the Smelt, the Trout-Perch, the Lake Chub, the Burbot, the Northern Redbelly Dace, and the Slimy Sculpin. These fish could successfully reproduce even though summer water temperatures barely exceeded perhaps 8°C.

As the glacier retreated farther, waters warmed, but the network of waterways subsided to the extent that many drainage systems were no longer interconnected. Along the Atlantic Coast, these separate drainage systems acted as barriers or partial barriers to warm-water fish species which would otherwise have been able to disperse northward as climates warmed. The process of dispersement was limited to those species capable of enduring salt water near river mouths, or to the slow process of headwater capture, for those species unable to tolerate salt.

In contrast, we see the situation in central states, drained by one huge system. The Mississippi River system acted as a highway for species in the process of dispersing northward, and at many times since continental glaciation, this system was connected to what is now the Great Lakes-St. Lawrence system. As a result, many warmwater species either not found in Massachusetts or not native here are found to the north in the Great Lakes system (e.g., Gizzard Shad, Bowfin, Freshwater Drum).

#### The Catfishes Come to Massachusetts

Thus, upon the arrival of the first European settlers to New England, Massachusetts waters had quite a few "vacant" (or, if you prefer, "incompletely exploited") ecological niches. Only one or possibly two species of ictalurid catfishes had arrived, but certainly others could survive. This was subsequently demonstrated when the Massachusetts Division attempted to supplement the native stocks of Brown Bullheads. Around the last part of the 19th Century, and the first part of this one, it was common practice, as state stocking records show, to stock "bullheads" (species not determined) which had been obtained elsewhere. In this manner, Massachusetts obtained several additions to our ichthyofauna, including the Channel Catfish (Ictalurus punctatus), the White Catfish (Ictalurus catus), the Black Bullhead (Ictalurus melas; one specimen record exists), possibly the Yellow Bullhead (Ictalurus natalis) (this may be native), and one madtom: the Tadpole Madtom (Noturus gyrinus).

The presence of the Tadpole Madtom in the state was discovered by Dr. Britton C. McCabe in 1945, while he was conducting a fisheries survey for the Massachusetts Division of Fish and Game. The one specimen was found in Thompson's Pond in Spencer, at the extreme headwaters of the Chicopee River system, itself a tributary of the Connecticut. For a couple of decades thereafter, the fish remained very difficult to locate, and I can recall a college field trip to the area in 1967 which failed to produce any specimens.

Over a decade later, it became apparent that the fish was spreading. Specimens were being reported farther downstream, and also in an adjacent drainage system, that of the Thames River. One such report placed the fish just a few miles from my home, and of course I visited the site. Here the water was too deep for seining, or the bottom was strewn with large rocks which would impede a normal seine haul. I tried leaving some baited minnow traps overnight, but these were stolen or vandalized. Eventually I devised a trap of discarded beverage cans. These were anchored overnight in deep water, and some madtoms began to take shelter in them. At least in some cases, the madtoms would remain inside when the traps were retrieved. This enabled me to bring a few specimens to hand.

## Noturus and Subgenus Schilbeodes

The Tadpole Madtom (N. gyrinus) is a member of the subgenus Schilbeodes, and many older works still refer to the fish as Schilbeodes gyrinus. The name Schilbeodes was originally proposed by Bleeker (as a genus), who drew the analogy between this fish, which he believed lacked an adipose fin, and the Old World catfish genus Schilbe, which in fact lacks that fin.

The virtues of the genus Noturus as potential aquarium inhabitants were discussed in an earlier article in this publication, the subject of which was the subgenus Rabida. In contrast to Rabida, the subgenus Schilbeodes tends to be more subdued in coloration, but the other assets remain. In fact, those who appreciate subtlety of hue will find much beauty in the bronzes and ambers of Schilbeodes. This subgenus tends to range more widely than the other, and several of its species have rather broad distributions. Thus, they are somewhat more available than those of Rabida.

Schilbeodes is further differentiated from Rabida by a higher average number of vertebra, and by possession of straighter pectoral spines less formidably armed with retrorse serrae. Such considerations are of purely academic interest to the aquarist.

### The Tadpole Madtom

The Tadpole Madtom is in two respects atypical of Schilbeodes. Anatomically, its mouth is terminally located rather than subterminally, and ecologically, N. gyrinus is an inhabitant of more sluggish waters, the remainder of the subgenus preferring riffle habitats. These two points are of interest to the aquarist. The terminal mouth of N. gyrinus is larger than that of other madtoms of comparable size, and tankmates should be chosen accordingly. And of course the habitat considerations tell us where to find the fish.

### The Margined Madtom, N. insignis

Another madtom which has become established in New England waters is the Margined Madtom (N. insignis), mistakenly known in some references as N. marginatus. This has been found as an introduction in the Merrimack River in the vicinity of Concord, New Hampshire. Whereas the native distribution of N. gyrinus is largely confined to the lowlands of the Atlantic Coastal Plain, those of the Mississippi Valley, and sluggish waterways of the Great Lakes drainage, N. insignis is found on higher ground, paralleling the Atlantic Coast just above the fall line. The few specimens I have had the opportunity to study and photograph were sent to me from central Pennsylvania.

In contrast to the warm amber coloration of N. gyrinus, N. insignis is characterized by a silvery-gray body color, highlighted in most populations by a margin of dark pigment about the unpaired fins. N. gyrinus attains a standard length of just over four inches, and the largest known specimen of N. insignis was about five.

leptacanthus, nocturnus, exilis

I have not had the chance to work with the remainder of the subgenus, but enterprising naturalists/aquarists in our southeastern states should keep an eye out for N. leptacanthus. This fish may be found in appropriate habitat almost anywhere in that region except for the southern part of Florida. It promises to be an attractive species in that its color is described as "reddish-yellow, slightly blotched." The maximum size is about three inches standard length.

A broadly distributed species somewhat farther west is N. nocturnus, found throughout much of the area drained directly by the Mississippi River. This species is yellowish brown to dark brown. It has been known to reach five inches in standard length, though it does not often exceed four.

Of slightly more restricted distribution in the same region is N. exilis, whose geographical range centers in the Ozarks of Missouri and Arkansas. In life its color is yellowish-brown to gray-black. Of note to aquarists is the fact that the largest known specimen, 113 mm in standard length, was grown to that size in an aquarium at the University of Michigan. It has been my observation that fishes from temperate regions can often be induced to grow as large, or larger, in captivity than they normally do in the wild. I base this statement on the experience of a friend who prides himself on such accomplishments. He has succeeded in raising the Tesselated Darter (Etheostoma olmstedii) and the Longnose Dace (Rhinichthys cataractae) to sizes exceeding any that I can find reported in the literature for their respective species. This is no doubt a consequence of a 365-day growing season in captivity.

funnebris, phaeus, gilberti, lachneri

Of more restricted distribution along the Gulf Coast is Noturus funnebris, found principally in the southern parts of Alabama and Mississippi, and in the Florida panhandle. This species is brownish-black, grayish-black, or even gun-metal blue. This last variation must indeed be striking in an aquarium. This species reaches about five inches in standard length.

Two members of Schilbeodes exhibit the extreme degree of endemism characteristic of Rabida. These are Noturus gilberti and Noturus lachneri. N. gilberti occupies but

a small section of the uplands of North Carolina where it is protected as an endangered species. It bears the promising common name of Orangefin Madtom. Written reports of its coloration attest to the suitability of this appellation. N. lachneri is a dark brown fish found only in the Ouachita Mountains of Arkansas. Though no doubt deserving our concern, this fish is not specifically protected by either federal or state regulations. N. lachneri does not exceed three inches in standard length; N. gilberti exceeds this but slightly.

Of course the remaining subgenus of Noturus to be discussed is the nominate, monotypic Noturus. But if I begin to write about that now, I won't have an excuse to do another article.

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