

**Food Habits of the Brindled Madtom, *Noturus minurus* Jordan, and the Redfin Shiner, *Notropis umbratilis* Girard, from West Central Indiana**

JOHN O. WHITAKER, JR.

Department of Life Sciences, Indiana State University  
Terre Haute, Indiana 47809.

**Introduction**

There is apparently no detailed information available on the food habits of the Brindled Madtom, *Noturus miurus*, or the Redfin Shiner, *Notropis umbratilis*. Thus, stomach and upper intestinal contents from all specimens of this species in the Indiana State University Vertebrate Collection were examined. The purpose of this paper is to present the results of this analysis.

**Methods and Materials**

Contents of the stomachs and intestines of fish were emptied into water glasses and examined with a zoom dissecting microscope. Identifications were made by comparison with materials collected in the field.

**Results and Discussion**

A total of 144 Brindled Madtoms was examined, mostly from Otter Creek, Vigo County, 8 mi NE Terre Haute (60 individuals), Brouillettes Creek, Vigo Co., 6 mi NW Terre Haute (45), and from Putnam County (Deer and Limestone Creeks, 35). The remaining fish were from White River at Petersburg, Indiana (Pike Co., 3 individuals), and the Wabash River (Vigo County, 1).

To get some idea of differing food habits by age, the madtoms were separated into two groups, those 40 mm and under standard length, and those over 40 mm. Of the 144 fish examined, only 107 contained food. Fish containing food, followed by the total number examined for each month are as follows. July, 12 of 13 (92.3%); August, 8 of 8 (100.0%); September, 65 of 76 (85.5%); October, 9 of 18 (50.0%); November, 13 of 25 (52.0%); and December, 0 of 4 (0%). There appeared to be much less feeding in winter than in summer.

Data on foods eaten are summarized in Table 1. Main foods of individuals under 40 mm standard length were chironomid and trichopteran larvae and pupae, these four items totalling 82.2% of the food. Small trichopteran cases made up an additional 0.4% of the volume. Chironomid larvae alone comprised about half the total food, and had been eaten by 75% of the fish. A total of nine different items was taken from stomachs. All items identified were aquatic forms, except adult dipterans taken in two stomachs, forming 1.4% of the volume.

Food of the larger individuals was more varied, with a total of 14 items being found. Chironomid and trichopteran larvae and pupae made up a smaller proportion of the food, collectively forming 63.3% of the volume, but small (about 2.5 to 3 mm long) trichopteran houses, with their included larvae, made up 21.6% of the food in the larger fish. It was represented at very low rates in Putnam County and Brouillettes Creek samples, but was abundant in the fish from Otter Creek, forming 33.2% of the food of the larger fish there. Chironomid larvae made up 37.8% of the volume and were found in 82.7% of the fish. Three items, adult Diptera, Cicadellidae, and Cercopidae, were present which were definitely terrestrial, but these formed only 2.1% of the volume.

TABLE 1. *Food of 107 Brindled Madtoms, Noturus miurus, from west central Indiana.*

|                     | Under 40 mm<br>(n = 49) |             | Over 40 mm<br>(n = 58) |             |
|---------------------|-------------------------|-------------|------------------------|-------------|
|                     | % Volume                | % Frequency | % Volume               | % Frequency |
| Chironomidae        |                         |             |                        |             |
| Larvae              | 49.5                    | 75.5        | 37.8                   | 82.8        |
| Pupae               | 3.9                     | 4.1         | 0.7                    | 1.7         |
| Trichoptera         |                         |             |                        |             |
| Larvae              | 19.6                    | 28.6        | 18.2                   | 32.8        |
| Pupae               | 9.3                     | 16.3        | 6.6                    | 3.4         |
| Small houses        | 0.4                     | 2.0         | 21.6                   | 44.8        |
| Unidentified insect | 11.4                    | 18.4        | 7.3                    | 17.2        |
| Ephemera naiads     | 4.0                     | 6.1         | 1.1                    | 1.7         |
| Diptera             |                         |             |                        |             |
| Unidentified adults | 1.4                     | 4.1         | 0.1                    | 1.7         |
| Unidentified larvae | 0.5                     | 2.0         | 3.6                    | 8.6         |
| Cicadellidae        | —                       | —           | 1.0                    | 1.7         |
| Cercopidae          | —                       | —           | 1.0                    | 1.7         |
| Elmidae             | —                       | —           | 0.4                    | 1.7         |
| Culicidae — larvae  | —                       | —           | 0.3                    | 1.7         |
| Coleoptera          |                         |             |                        |             |
| Unidentified adult  | —                       | —           | 0.2                    | 1.7         |
|                     | 100.0                   |             | 99.9                   |             |

A total of 213 stomachs of *Notropis umbratilis* was examined, of which 123 contained food. Numbers examined by month (including number and percent with food) were April, 14 (9, 64.3%); July, 110 (87, 79.1%); August, 17 (8, 47.1%); September 56 (18, 32.1%); October, 6 (1, 16.7%); and November, 10 (0, 0%).

It appears that little feeding occurs in winter. It does seem strange, however, that so few fish in September contained food. The overall food of the species is given in Table 2. A great variety of food was eaten, nearly all of it of terrestrial origin.

The most important single foods were ants, Formicidae, at 20.7% and adult midges, Chironomidae, at 19.3% of the total volume of food eaten. Beyond these items, a great variety of foods was eaten, most of it of terrestrial origin and most presumably being gleaned from the surface of the water, as one would expect in view of the superior position of the mouth of this species.

Although sporadic aquatic forms were taken (Corixidae, Ephemera naiads), early spring, as represented by the April sample, was the only time significant feeding on aquatic forms occurred. At that time, four of the nine fish with food

TABLE 2. Food of 123 Redfin Shiners, *Notropis umbratilis*, taken April through November in Vigo County, Indiana. (Adult insects unless otherwise indicated.)

|                              | % Volume | % Frequency |
|------------------------------|----------|-------------|
| DIPTERA — Flies              |          |             |
| Chironomidae                 | 19.3     | 40.7        |
| Chironomidae — pupae         | 3.1      | 4.9         |
| Chironomidae — larvae        | 0.2      | 0.8         |
| Simuliidae                   | 2.0      | 2.4         |
| Tipulidae                    | 1.3      | 2.4         |
| Dolichopodidae               | 0.4      | 0.8         |
| Syrphidae                    | 0.4      | 0.8         |
| Otitidae                     | 0.2      | 0.8         |
| Sciaridae                    | 0.1      | 1.6         |
| Unidentified Diptera         | 13.6     | 42.3        |
| HYMENOPTERA — Ants and Wasps |          |             |
| Formicidae                   | 20.7     | 39.8        |
| Unidentified Hymenoptera     | 4.2      | 9.8         |
| COLEOPTERA — Beetles         |          |             |
| Curculionidae                | 1.2      | 2.4         |
| Chrysomelidae                | 0.8      | 0.8         |
| Elmidae                      | 0.8      | 0.8         |
| Cucujidae                    | 0.7      | 0.8         |
| Tenebrionidae                | 0.5      | 1.6         |
| Elateridae                   | 0.5      | 0.8         |
| Cryptophagidae               | 0.1      | 0.8         |
| Unidentified Coleoptera      | 2.8      | 7.3         |
| Coleoptera — larvae          | 1.0      | 2.4         |
| HEMIPTERA                    |          |             |
| Corixidae                    | 2.0      | 2.4         |
| Miridae                      | 0.7      | 0.8         |
| Lygaeidae                    | 0.4      | 1.6         |
| Neididae                     | 0.2      | 0.8         |
| Unidentified Hemiptera       | 1.3      | 4.1         |
| HOMOPTERA                    |          |             |
| Cicadellidae                 | 2.3      | 4.9         |
| Aphididae                    | 1.0      | 3.3         |
| Delphacidae                  | 0.7      | 1.6         |
| Fulgoridae                   | 0.7      | 0.8         |
| Membracidae                  | 0.6      | 0.8         |
| Cercopidae                   | 0.4      | 0.8         |
| TRICHOPTERA                  |          |             |
| Adult                        | 1.0      | 2.4         |
| Larvae                       | 1.6      | 1.6         |
| LEPIDOPTERA                  |          |             |
| Adult                        | 1.1      | 2.4         |
| Larvae                       | 2.4      | 2.4         |
| SIPHONAPTERA                 | 0.6      | 4.9         |
| THYSANOPTERA                 | 0.9      | 7.3         |
| EPHEMERIDAE                  |          |             |
| Naiad                        | 0.4      | 0.8         |
| CORRODENTIA                  |          |             |
| Psocidae                     | 0.04     | 0.8         |
| Unidentified Insect          | 2.9      | 8.1         |

TABLE 2.—Continued

|          |      |     |
|----------|------|-----|
| ARANEIDA | 4.3  | 5.7 |
| Seeds    | 0.3  | 0.8 |
| Feather  | 0.1  | 0.8 |
|          | 99.8 |     |

had fed on chironomid larvae or pupae (44% frequency, 40% of the volume in the April sample).

Both midges and unidentified Diptera often consisted of numbers of tiny flies in individual stomachs. It appeared that these may have been eaten, several at a time, from the surface.

Particularly interesting items found in the stomachs of 6 different fish, were fleas, one per stomach. Three were dog fleas, *Ctenocephalides canis*; one was a mouse flea, *Orchopeas leucopus*; one was a shrew flea, *Ctenophthalmus pseudagyrtes*, and the last was too mutilated to be identified. My guess was that the fleas were from animals which had been dead in the stream.

Foods eaten by smaller sized fish (under 40 mm standard length) (total of 19 individuals with food were examined) were chironomid adults (23.2% volume, 36.8% frequency), unidentified Diptera (22.6%, 31.6%), chironomid pupae (16.1%, 26.3%), ants (10.8%, 21.1%), Hymenoptera (10.5%, 10.5%), Trichoptera larvae, Hemiptera and Simuliidae (each 5.3%, and 5.3%), flea (1.1%, 5.3%).