

A PRELIMINARY SURVEY OF THE TRICHOPTERA OF THE OZARK MOUNTAINS, MISSOURI, U.S.A.¹

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ABSTRACT: One hundred thirty-three species of caddisflies representing 15 families and 49 genera are reported from the Ozark Mountains of Missouri. Families exhibiting the greatest species richness included the Hydroptilidae (36 spp.), Leptoceridae (26 spp.), and Hydropsychidae (26 spp.). Sixty-four species are reported for the first time from the state.

With regard to its trichopteran fauna, the central region west of the Mississippi River is one of the more poorly-studied areas in the United States. Iowa, Missouri, Nebraska, Oklahoma, and South Dakota lack comprehensive species lists. In an attempt to increase our knowledge about caddisflies inhabiting this region, we initiated studies in mountainous areas of Oklahoma and Missouri. We report here on our results from the Ozark Mountains of Missouri.

The Ozark Mountains are the northernmost range of the Interior Highlands extending southward from the Missouri River into northern Arkansas, westward into Oklahoma, and eastward into Illinois. Within Missouri, the Ozarks can be divided into two physiographic provinces, the Border and the Plateau (Fig. 1) (Thom and Wilson 1980). The Ozark Border extends as a narrow band along the lower Missouri River eastward to the Mississippi River south of St. Louis. The larger Ozark Plateau lies south of the Border region encompassing most of the southern half of the state. Our collections were drawn primarily from the latter province, an area characterized by thin limestone soils and abundant clean streams and large volume springs (Johnson 1987). Agricultural impacts are minimal, primarily consisting of small-scale livestock-rearing operations. Much of the area is incorporated into the Mark Twain National Forest and supports a mixed oak-hickory assemblage not subjected to wholesale clearcutting. The combination of infertile, rugged landscapes not conducive to agriculture, minimal value of forest products, and relatively little urbanization or heavy industry has not encouraged large scale anthropogenic disturbances in this area.

Five states bordering Missouri have comprehensive inventories of their Trichoptera; 153 species are reported from Arkansas (Unzicker *et al.* 1970; Bowles and Mathis 1989), 183 From Illinois (Ross 1944), 104

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from Kansas (Hamilton and Schuster 1978, 1979, 1980; Hamilton *et al.* 1983), 181 from Kentucky (Resh 1975; Phillippi and Schuster 1987), and 298 from Tennessee (Edwards 1966; Etnier and Schuster 1979). During this investigation, 133 species were collected from the Ozark Mountains of Missouri raising the total number of trichopterans reported from the state to 143 species. These results suggest the presence of a rich trichopteran fauna within the state, especially considering that only the Ozark Mountain region has been sampled intensely.

One hundred eight UV-light samples were collected between June 1985 and October 1988. Other locations were sampled by sweep-netting and handpicking of immature stages. Additional records were obtained from the collection of Trichoptera at the Illinois Natural History Survey (INHS) and from published accounts, especially those of Ross (1944) and Gordon (1974). The majority of species determinations were based on male specimens, but females and larvae were used in some instances.

In the species list, the scientific name and citation of taxonomic authorship are followed by numbers corresponding to specific collection sites and by month of collection. In cases where determinations were based on material other than males, the nature of the material is given in parentheses. Specimens representing possible new taxa are designated by the abbreviation "nr." between the genus and specific epithet of their closest relative. The initial report is cited for those species previously reported from the Ozarks of Missouri. Sixty-four new state records are indicated by an asterisk (*). Voucher specimens are deposited in the University of Arkansas Arthropod Museum, INHS, or collections of the authors. Higher taxonomy is according to Weaver and Morse (1986).

COLLECTION SITES

1. Barry Co.; Roaring River State Park; 6 mi S Cassville, Hwy 112; June.
2. Carter Co.; Current River, Ozark National Scenic Riverway (ONSR); Big Spring National Park; 7 mi S Van Buren, Hwy 103; August.
3. Carter Co.; Big Spring, ONSR; Big Spring National Park; 7 mi S Van Buren, Hwy 103; May-August.
4. Christian Co.; Swan Creek; Hwy 125 bridge at Garrison; August.
5. Crawford Co.; Meramec River; Hwy 19 bridge; 1 mi N Steelville; INHS.
6. Crawford Co.; Onondaga Cave spring run; October; INHS.
7. Dent Co.; Crooked Creek (Wilson, 1984).
8. Dent Co.; Current River; Montauk State Park; 23 mi SE Salem, Hwy 119; October.
9. Franklin Co.; Meramec River; 5 mi SW St. Clair, PP Hwy; June.
10. Gasconade Co.; Stony Hill; September; INHS.
11. Iron Co.; Champion Springs; near Annapolis; April; INHS.
12. Iron Co.; Speers Spring; 5 mi N Annapolis, Hwy 49; July; INHS.
13. Iron Co.; Stout's Creek; Royal Gorge near Arcadia; July; INHS.

14. Laclede/Dallas Co.; Bennett Spring; Bennett Spring State Park; 11 mi W Lebanon, Hwy 64; October, November.
15. Laclede/Dallas Co.; Niangua River; Hwy 64 bridge; 12 mi W Lebanon; October.
16. Lawrence Co.; Spring River; Hwy 60 bridge; 2 mi S. Aurora; August, October.
17. McDonald Co.; unnamed spring along Hwy 71; 1 mi NW of Arkansas state line; July.
18. McDonald Co.; Elk River; Mt. Shira Public Fishing Area; 1 mi N Noel, Hwy 59; July.
19. McDonald Co.; Little Sugar Creek; 3 mi S Pineville, Hwy 71; July.
20. Miller Co.; Lake of the Ozarks; Bagnell Dam; May; INHS.
21. Oregon Co.; Eleven Point River; Hwy 19 bridge; 1.5 mi NE Greer; July, September.
22. Oregon Co.; Greer Spring; June; INHS.
23. Ozark Co.; Althea Spring; 8 mi NW Caulfield, H Hwy; August.
24. Ozark Co.; North Fork White River; Patrick Bridge Access; H Hwy, 8 mi NW Caulfield; August.

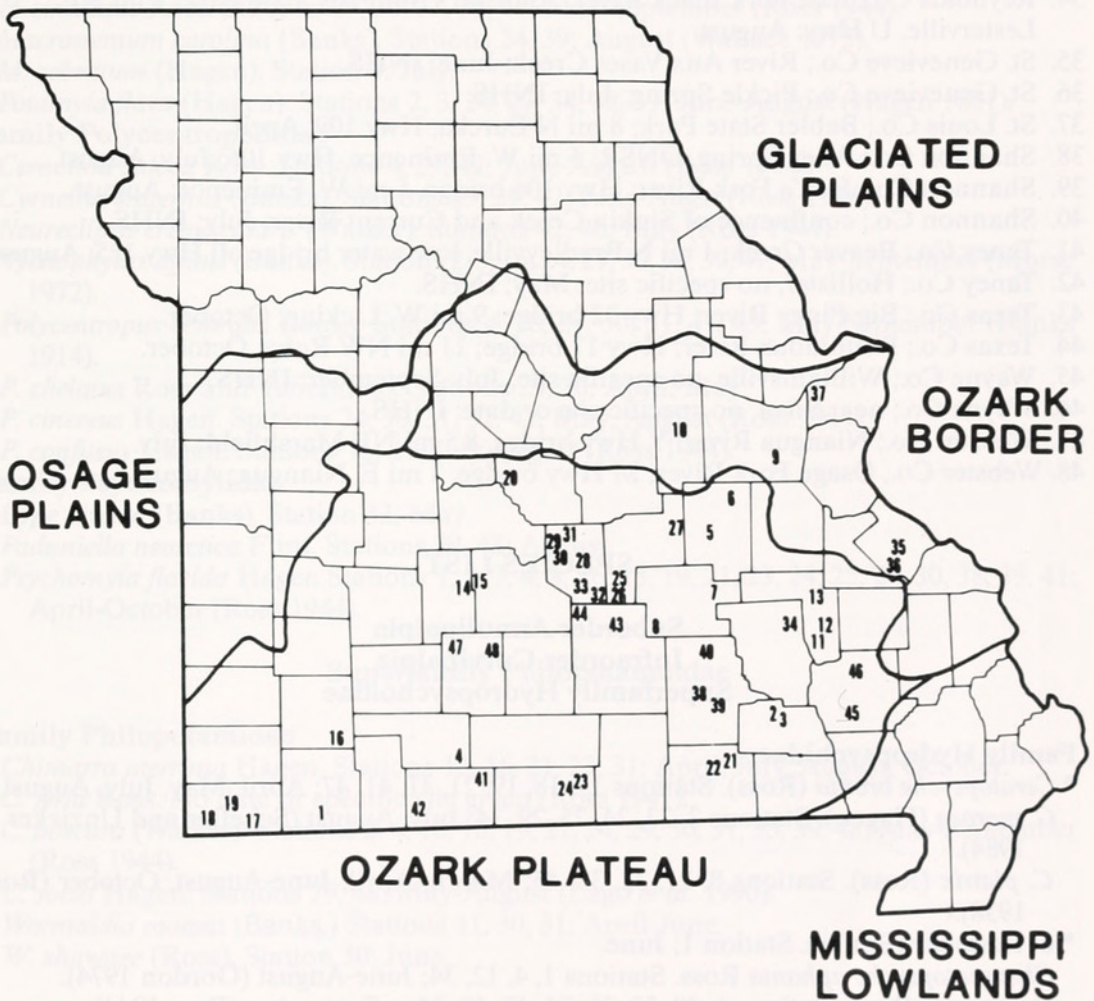


Figure 1. Collection sites and physiographic provinces of Missouri (after Johnson, 1987). Numbers correspond to those provided in text for "Collection Sites."

25. Phelps Co.; Spring Creek; bridge at junction Hwy M and J; 6 mi W Flat; July.
26. Phelps Co.; unnamed spring, tributary of Spring Creek; NW 1/4, NE 1/4, Section 27, T 35 N, R 10 W; October.
27. Phelps Co.; Maramec Spring; 5 mi SE St. James, Hwy 8; October-January.
28. Pulaski Co.; Waynesville Spring; along Roubidoux River in Waynesville, Loop 44; June.
29. Pulaski Co.; Gasconade River; downstream T Hwy bridge; 5 mi SE Swedeborg; March-November.
30. Pulaski Co.; Cave Spring; Wayne Roam farm near Swedeborg; S Road T-740; March-November.
31. Pulaski Co.; unnamed spring; Edith Roan farm near Swedeborg; Road T-740; March-November.
32. Pulaski Co.; Fort Leonard Wood; no specific site; May; INHS.
33. Pulaski Co.; Stone Mill Spring; Fort Leonard Wood; NE 1/4, SW 1/4, Section 21, T 35 N, R 10 W; October.
34. Reynolds Co.; East Fork Black River; Johnson's Shut-Ins State Park; 3 mi NE Lesterville, U Hwy; August.
35. St. Genevieve Co.; River Aux Vases Creek; June; INHS.
36. St. Genevieve Co.; Pickle Spring; July; INHS.
37. St. Louis Co.; Babler State Park; 8 mi N Eureka, Hwy 109; April.
38. Shannon Co.; Alley Spring, ONSR; 5 mi W. Eminence, Hwy 106; July, August.
39. Shannon Co.; Jack's Fork River; Hwy 106 bridge, 5 mi W. Eminence; August.
40. Shannon Co.; confluence of Sinkin Creek and Current River; July; INHS.
41. Taney Co.; Beaver Creek; 1 mi N Bradleyville, low-water bridge off Hwy 125; August.
42. Taney Co.; Hollister, no specific site; May; INHS.
43. Texas Co.; Big Piney River; Hwy 32 bridge; 9 mi W. Licking; October.
44. Texas Co.; Roubidoux River; Hwy 17 bridge; 11 mi NW Roby; October.
45. Wayne Co.; Williamsville, no specific site; July-September; INHS.
46. Wayne Co.; near Silva, no specific site or date; INHS.
47. Webster Co.; Niangua River; Y Hwy bridge, 8.5 mi NE Marshfield; July.
48. Webster Co.; Osage Fork River; M Hwy bridge, 3 mi E. Niangua; August.

SPECIES LIST

Suborder Annulipalpia Infraorder Curvialpia Superfamily Hydropsychoidae

Family Hydropsychidae

- * *Ceratopsyche bronta* (Ross). Stations 17, 18, 19, 21, 31, 41, 47; April, May, July, August.
- C. morosa* (Hagen). Stations 2, 23, 24, 25, 29, 34; July, August (Scheffer and Unzicker 1984).
- C. piatrix* (Ross). Stations 8, 21, 22, 38, 45; March, April, June-August, October (Ross 1938).
- * *C. slossonae* (Banks). Station 1; June.
- Cheumatopsyche aphantia* Ross. Stations 1, 4, 12, 34; June-August (Gordon 1974).
- C. campyla* Ross. Stations 1, 29, 30, 31, 34, 47, 48; May-September (Ross 1944).
- * *C. gracilis* (Banks). Station 2; June.
- * *C. harwoodi enigma* Ross, Morse and Gordon. Station 41; August.
- C. lasia* Ross. Station 45; September (Ross 1944).
- C. minuscula* (Banks). Stations 4, 29, 30, 31, 38, 39, 41, 45, 48; May-September (Gordon 1974).

- C. oxa* Ross. Stations 1, 16, 24, 25, 30, 31, 41, 48; May-August (Gordon 1974).
C. pettiti (Banks). Stations 8, 9, 21, 22, 27, 29, 30, 31, 41, 47; May-October (Gordon 1974).
 * *C. rossi* Gordon. Stations 21, 38, 39; April, July, August.
C. sordida (Hagen). Stations 2, 3, 18, 19, 24, 29, 30, 31, 34, 38, 39; May-September (Ross 1944).
C. speciosa (Banks). Stations 1, 20, 42, 45; May-August (Ross 1944).
 * *Diplectrona modesta* Ross. Station 31; May-July, September.
 * *D. metaqui* Ross. Station 31 (larva); January.
Hydropsyche arinale Ross. Station 13; July (Ross 1944).
 * *H. betteni* Ross. Stations 1, 29 (female); May, June.
H. bidens Ross. Station 45; August (Ross 1944).
H. orris Ross. Station 39; August (Nimmo 1987).
H. scalaris Hagen. Stations 10, 18, 28, 29, 30, 31, 38, 39, 41; May-September (Ross 1944).
H. simulans Ross. Stations 29, 30, 31, 35, 45; May-September (Ross 1944).
Macrostemum carolina (Banks). Stations 24, 39; August (Wallace 1975).
 * *M. zebratum* (Hagen). Station 3; July.
Potamyia flava (Hagen). Stations 2, 3, 24, 29, 34, 38, 39; June-August (Hagen 1861).
- Family Polycentropodidae**
Cernotina calcea Ross. Stations 4, 29, 42; June-August (Ross 1944).
Cynellus fraternus (Banks). Stations 29, 39, 42; June-August (Ross 1944).
Neureclipsis crepuscularis (Walker). Stations 42, 46; May (Ross 1944).
Nyctiophylax affinis (Banks). Stations 2, 3, 16, 24, 29, 30, 34, 39, 41; May-September (Morse 1972).
Polycentropus centralis Banks. Stations 4, 10, 29, 30, 31, 41, 45; May-September (Banks 1914).
 * *P. chelatus* Ross and Yamamoto. Stations 29, 30; April, May.
P. cinereus Hagen. Stations 24, 30, 31, 32, 42; May, August (Ross 1944).
P. confusus Hagen. Stations 16, 21; July, August (Ross 1944).
- Family Psychomyiidae**
 * *Lype diversa* (Banks). Station 32; May.
 * *Paduniella nearctica* Flint. Stations 39, 48; August.
Psychomyia flavida Hagen. Stations 1, 2, 3, 4, 8, 16, 18, 19, 21, 23, 24, 25, 29, 30, 38, 39, 41; April-October (Ross 1944).

Superfamily Philopotamoidae

Family Philopotamidae

- * *Chimarra aterrima* Hagen. Stations 12, 16, 21, 23, 31; April, July, August, October.
C. feria Ross. No date or specific site given (Ross 1941).
C. obscura (Walker). Stations 2, 4, 16, 18, 19, 21, 24, 29, 30, 31, 35, 39, 48; May-September (Ross 1944).
C. socia Hagen. Stations 29, 48; May-August (Lago *et al.* 1990).
 * *Wormaldia moesta* (Banks.) Stations 11, 30, 31; April-June.
 * *W. shawnee* (Ross). Station 30; June.

Infraorder Spicipalpia Superfamily Hydroptiloidea

Family Glossosomatidae

- Agapetus artesus* Ross. Stations 21, 22, 27; July, October-January (Ross 1938).
A. illini Ross. Stations 11, 20, 21, 29, 37, 38; April-August (Ross 1944).
Glossosoma intermedium (Klapalek). Stations 3, 23, 26, 38; August, October (Nimmo 1974).

- Protophila lega* Ross. Stations 21, 24, 29, 39; May-August (Ross 1941).
- * *P. maculata* Hagen. Stations 2, 3, 21, 29, 30; May-August.
 - P. sp. nr. maculata*. Stations 3, 39; August.
 - * *P. tenebrosa* (Walker). Stations 21, 24, 29; July, August.
- Family Hydroptilidae**
- * *Hydroptila ajax* Ross. Stations 29, 47; July.
 - H. albicornis* Hagen. Stations 2, 3, 8, 18, 19, 21, 24, 28, 29, 30, 31, 38, 39; April-October (Ross 1944).
 - H. angusta* Ross. Stations 4, 29; July, August (Hamilton and Schuster 1978).
 - * *H. armata* Ross. Stations 15, 18, 21, 24, 29, 30, 31, 48; April-October.
 - H. artesa* Mathis and Bowles. Stations 3, 8, 21, 23, 24, 38, 39; July-October (Mathis and Bowles 1990).
 - * *H. broweri* Blickle. Stations 4, 23, 24, 34, 39; August.
 - * *H. consimilis* Morton. Stations 1, 8, 15, 21, 25, 28, 29, 30, 31, 38, 47; May-August, October.
 - H. grandiosa* Ross. Stations 3, 15, 24, 29, 30, 31, 34, 38, 39; April-October (Ross 1944).
 - H. hamata* Morton. Stations 2, 3, 4, 18, 19, 24, 29, 30, 31, 34, 38, 39; April-September (Ross 1944).
 - * *H. perdita* Morton. Stations 2, 3, 4, 15, 18, 24, 25, 29, 30, 31, 34, 38, 39, 47, 48; April-October.
 - * *H. spatulata* Morton. Stations 3, 23, 24, 29, 30, 39; April-August.
 - H. nr. strepha*. Stations 24, 38, 39; August.
 - * *H. tusculum* Ross. Station 38; August.
 - * *H. virgata* Ross. Station 3; August.
 - * *H. waubesia* Betten. Stations 29, 30, 31; June-September.
 - * *Ithytrichia clavata* Morton. Stations 2, 3, 29, 39; June, August.
 - Leucotrichia pictipes* (Banks). Station 7; no date given (Wilson 1984).
 - Neotrichia kitae* Ross. Station 42; May (Ross 1941).
 - N. minutissimella* (Chambers). Stations 2, 24, 39, 45; June, August (Ross 1944).
 - N. vibrans* Ross. Stations 24, 29, 39, 42, 45; June-September (Ross 1944).
 - * *Ochrotrichia anisca* (Ross). Stations 29, 30, 31; May-July.
 - * *O. arva* (Ross). Stations 23, 24; August.
 - O. contorta* (Ross). Station 22; June (Ross 1941).
 - * *O. eliaga* (Ross). Station 30; May, June.
 - * *O. riesi* Ross. Station 31; September.
 - * *O. spinosa* (Ross). Stations 3, 8, 23; August, October.
 - O. tarsalis* (Hagen). Stations 2, 3, 4, 28, 29, 30, 31, 38, 39, 42; May-September (Ross 1944).
 - * *O. unio* (Ross). Station 30; June.
 - * *Orthotrichia aegerfasciella* (Chambers). Stations 16, 29, 30, 31, 47; May-September.
 - * *O. cristata* Morton. Stations 29, 30, 47; June, July.
 - * *Oxyethira coercens* Morton. Stations 8, 24, 38, 39; August, October.
 - O. dualis* Morton. Stations 3, 16, 27, 29, 38; July, August, October (Ross 1944).
 - * *O. forcipata* Mosely. Stations 30, 34, 47; June-August.
 - * *O. pallida* (Banks). Stations 3, 19, 24, 28, 29, 30, 34, 39, 48; June-September.
 - * *O. zeronia* Ross. Station 34; August.
 - * *Stactobiella delira* (Ross). Station 29; April.

Superfamily Rhyacophiloidea

Family Rhyacophilidae

- * *Rhyacophila fenestra* Ross. Stations 30, 31; May, June.
- * *R. glaberrima* Ulmer. Station 36; July.

Suborder Integripalpia
Infraorder Plenitentoria
Superfamily Limnephiloidea

Family Brachycentridae

Brachycentrus numerosus (Say). Station 45 (larvae); (Flint 1984).

Micrasema ozarkana Ross and Unzicker. Stations 14, 21, 22, 27; April, June, July, November (Ross and Unzicker 1965).

- * *M. rusticum* (Hagen). Stations 22, 32; May, June.

Family Lepidostomatidae

- * *Lepidostoma libum* Ross. Stations 30, 31; April, May.

L. togatum (Hagen). Stations 2, 3, 21, 24, 26, 33, 38, 42; April-August, October (Ross 1946).

Family Limnephilidae

- * *Frenesia missa* (Milne). Stations 30, 31; September-January.

Glyphopsyche missouri Ross. Station 27; October, November, January (Ross 1944).

- * *Ironoquia punctatissima* (Walker). Stations 30, 31; September, October.

- * *Neophylax concinnus* McLachlan. Stations 6, 30, 31; September-November.

N. fuscus Banks. Stations 5, 43, 44; October (Ross 1944).

- * *Pseudostenophylax uniformis* (Betten). Stations 30, 31; April-June.

- * *Pycnopsyche guttifer* (Walker). Stations 8, 14; October.

- * *P. subfasciata* (Say). Stations 15, 29; October.

Superfamily Phryganeoidea

Family Phryganeidae

Agrypnia vestita (Walker). No date or specific site given; (Wilson 1984).

Phryganea sayi Milne. Station 30; June (Hagen 1873).

- * *Ptilostomis ocellifera* (Walker). Station 13; July.

Infraorder Brevitentoria
Superfamily Leptoceroidea

Family Leptoceridae

Ceraclea ancylus (Vorhies). Station 29; May (Sullivan 1929).

C. cancellata (Betten). Stations 2, 4, 23, 24, 29, 30, 41; May-August (Ross 1944).

- * *C. flava* (Banks). Stations 29, 30; June.

C. maculata (Banks). Stations 2, 21, 25, 29, 30; June-August (Ross 1944).

- * *C. punctata* (Banks). Station 18; July.

C. tarsipunctata (Vorhies). Stations 29, 45; May, July (Ross 1944).

C. transversa (Hagen). Stations 2, 28, 29, 30, 31, 39, 41, 48; May, June, August (Resh 1976).

Mystacides sepulchralis (Walker). Station 39; August (Yamamoto and Wiggins 1964).

Nectopsyche candida (Hagen). Stations 21, 39; July-September (Haddock 1977).

- * *N. diarina* (Ross). Station 40 (larva); July.

N. exquisita (Walker). Stations 2, 3, 12, 18, 29, 39, 41, 42, 45; May-August (Ross 1944).

N. pavida (Hagen). Stations 3, 29, 39, 41; June-August (Ross 1944).

Oecetis avara (Banks). Stations 2, 3, 4, 12, 18, 21, 24, 29, 30, 31, 33, 34, 39, 41, 48; May-September (Ross 1944).

O. cinerascens (Hagen). Station 45; July, August (Ross 1944).

- * *O. ditissa* Ross. Stations 29, 30, 31, 41, 47; May-August.

O. sp. nr. eddlestoni. Station 34; August.

- O. inconspicua* (Walker). Stations 2, 16, 18, 21, 24, 27, 28, 29, 30, 31, 34, 38, 39, 41, 47; June-September (Ross 1944).
O. nocturna Ross. Stations 18, 29, 30, 31, 48; May-September (Ross 1966).
 * *O. persimilis* (Banks). Stations 2, 29, 39, 41; May, August.
Setodes oxapius (Ross). Stations 2, 3, 21, 24, 29, 30, 31, 34, 38, 39, 45; May-September (Holzenthal 1982).
 * *Triaenodes flavescens* Banks. Station 30; August.
 * *T. ignitus* (Walker). Station 29; May.
 * *T. injustus* (Hagen). Stations 29, 30, 31, 34, 38, 39; May, June, August, September.
 * *T. marginatus* Sibley. Station 24; August.
 * *T. nox* Ross. Station 4; August.
 * *T. tardus* Milne. Station 29; July.

Family Molannidae

- * *Molanna blenda* Sibley. Stations 21, 30; May, July.

Family Odontoceridae

- * *Marilia flexuosa* Ulmer. Stations 4, 18, 19, 39; July, August.

Superfamily Sericostomatoidea

Family Helicopsychidae

- Helicopsyche borealis* (Hagen). Stations 1, 2, 3, 4, 12, 16, 18, 19, 21, 23, 27, 29, 30, 34, 38, 39, 41, 48; May-September (Ross 1944).

SUMMARY

In addition to the 133 species reported herein, 10 other species of Trichoptera are reported from Missouri, but are either extralimital to the Ozarks or from unknown localities. These include three hydroptilids (*Mayatrichia ayama* Mosely (Ross 1944), *Neotrichia edalis* Ross (Blickle 1979), and *N. okopa* Ross (Hamilton and Schuster 1978)), two hydropsychids (*Hydropsyche rossi* Flint, Voshell, and Parker (Flint *et al.* 1979) and *H. venularis* Banks (Banks 1914)), two philopotamids (*Chimarra moselyi* (Denning) and *C. parasocia* Lago and Harris (Lago and Harris 1987)), two leptocerids (*Nectopsyche albida* (Walker) (Haddock 1977) and *N. spiloma* (Ross) (Ross 1944)), and one polycentropodid (*Plylocentropus placidus* (Banks) (Schuster and Hamilton 1984)). The validity of Bank's record of *H. venularis* from a site near St. Louis (Banks 1914) is uncertain. Flint *et al.* (1979) suggest that this species is common throughout the southeastern United States where it favors medium to large rivers, but did not include Bank's record among their valid ones for the species. If this record is valid, then a total of 143 species of Trichoptera have been reported from Missouri.

Endemism of Trichoptera within the Interior Highlands recently has been discussed in two reviews on the arthropod fauna of the southeastern U.S.A. Allen (1990) listed 22 species of caddisflies he considered

to be Interior Highland endemics; however, a careful review of Hamilton and Morse (1990) yielded only 13 species that are truly endemic to the region. Including those species described after the publication of Allen (1990) and Hamilton and Morse (1990), we know of 16 species of endemic Trichoptera that have been described from the Interior Highlands. These include nine species reported only from the Ozarks (*Agapetus artesus*, *Hydroptila artesus*, *Neotrichia kitae*, *N. arkansasensis* Mathis and Bowles, *Ochrotrichia contorta*, *Paduniella nearctica*, *Glyphopsyche missouri*, *Micrasema ozarkana*, and *Setodes oxapius*⁴), one species apparently confined to the Ouachitas (*Ochrotrichia weedlei* Ross), and six species that occur in both ranges (*Rhyacophila kiamichi* Ross, *Agapetus medicus* Ross, *Paucicalcaria ozarkensis* Mathis and Bowles, *Wormaldia strota* Ross, *Helicopsyche limnella* Ross, and *Lepidostoma ozarkense* Flint and Harp). Two other species once thought to be Interior Highland endemics have been collected recently outside the region. *Hydroptila sandersoni* Mathis and Bowles (Mathis and Bowles 1990) has been collected in northern Alabama (Steve Harris, personal communication); a single specimen of *Neotrichia edalis* was recovered from a sample sent to us from south-central Texas (San Marcos River, Hays County).

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⁴The type locality of *Setodes oxapius* given by Ross (1938) is Ellerville, OK, a town no longer shown on maps. It is located in Cherokee Co., 9 mi NE of Tahlequah, OK.

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