THE MAYFLIES (EPHEMEROPTERA) OF TENNESSEE, WITH A REVIEW OF THE POSSIBLY THREATENED SPECIES OCCURRING WITHIN THE STATE

L. S. Long¹ and B. C. Kondratieff²

ABSTRACT

One hundred and forty-three species of mayflies are reported from the state of Tennessee. Sixteen species (Ameletus cryptostimus, Choroperes basalis, Baetis virile, Ephemerella blanda, E. simulans, Ephemerella berneri, Heterocloeon curiosum, H. petersi, Labiobaetis ephippatus, Leptophlebia bradleyi, Macdunnnoa brunnea, Paraleptophlebia assimilis, P. debilis, P. molli, Rhithrogena pellucida and Siphlonurus mirus) are reported for the first time. Rare and vulnerable species occurring in the state are also discussed. This represents the first comprehensive statewide list of mayflies for Tennessee.


The checklist presented herein follows the classification of McCafferty (1996) and includes previous collection records, as well as unpublished records of the senior author or material deposited in the C. P. Gillette Museum of Arthropod Diversity, Colorado State University. A total of 144 species in 43 genera and 15 families is listed, including 16 new state records.

Type localities of six species of mayflies (Habrophlebiodes celeteria Berner, Paraleptophlebia kirchneri Kondratieff and Durfee, Serratella spiculosa (Berner and Allen), Isonychia diversa Traver, I. tusculanensis Berner, and Stenonema sinclari Lewis) are in Tennessee. Of the six species, four are also found outside the state; S. spiculosa from North Carolina (Berner and Allen 1961), H. celeteria and I. tusculanensis from Virginia (Kondratieff and Voshell 1984) and S. sinclari from West Virginia (Fisher and Tarter 1988).

¹ Aquatic Resources Center, P.O. Box 680818, Franklin, TN 37068-0818.
² Department of Entomology, Colorado State University, Fort Collins, CO 80523.
Nineteen species known from Tennessee are considered threatened or vulnerable to extirpation in surrounding states and therefore could be considered threatened in Tennessee due to limited distribution and disappearing habitat (Harris 1990, Kondratieff and Kirchner 1991, Morse et al. 1993, Peters 1994). Using Natural Heritage Global Rarity Ranks, the majority of these species can be categorized as "critically imperiled globally because of extreme rarity" or "imperiled globally because of rarity." Much of this rarity is being caused by anthropogenic stress to crenal and rhithral habitats by urban land development, forestry practices and chemical disturbances throughout Tennessee. Additional information on these species can be found following the county records.

Tennessee, with its varied physiographic provinces and its juxtaposition between major ecoregions of Eastern North America, may contain additional and possibly new species that have yet to be collected. Comparison with the mayfly fauna of surrounding states indicate that additional species are likely to occur in Tennessee, but have not yet been collected.

Although this list includes 143 species for Tennessee, 30 counties (31%) have yet to be sampled. Of the portion of the state that has been sampled for mayflies, 38 counties (40%) have 5 or less species listed, 10 counties (11%) have between 6 and 10 species listed, and only 17 (18%) counties have more than 10 species listed. West Tennessee (approximately 21 counties) has been virtually ignored, with only 17 records. In contrast, Sevier and Greene Counties in East Tennessee have been extensively collected over the years, each with 52 and 53 species records, respectively. With a majority of the state lacking adequate surveys, further research is necessary to determine which species are truly rare and which have been overlooked due to insufficient collecting.

Species list of Tennessee mayflies. The numbers following a species corresponds to the counties listed in Fig. 1, with the life stage in which it was collected (N—nymph, A—adult). An asterisk (*) indicates a new state record.

Superfamily Leptophleboidea
Family Leptophlebiidae
Genus Choroterpes Eaton

*Choroterpes basalis* (Banks)—89A. With Burian's (1995) recent review, only one variable eastern species is recognized.

Genus Habrophlebia Eaton

*Habrophlebia vibrans* Needham—89NA.

Genus Habrophlebiodes Ulmer


Genus Leptophlebia Westwood

*Leptophlebia bradleyi* (Needham)—78A. This widespread species is probably much more common than records indicate. Adults can be found from
Figure 1. Map of Tennessee indicating counties and physiographic provinces.
January to March, a time when little adult collecting is done. Nuptial flights occur throughout the day.
*Leptophlebia cupida* (Say)—38NA, 41N, 48N, 71A, 78NA, 80N, 89N, 90A.

**Genus Paraleptophlebia Lestage**

*Paraleptophlebia assimilis* (Banks)—62A, 88A, 89A.
*Paraleptophlebia debilis* (Walker)—88A, 89A.
*Paraleptophlebia jeanoae* Berner—60A. This species is listed as threatened in Alabama (Harris, 1990) and known from only one site in Virginia, where it is considered a species of “special concern” (Kondratieff and Kirchner 1991). The nymph of this species was recently described by Randolph and McCafferty (1996) from Indiana populations.
*Paraleptophlebia kirchneri* Kondratieff & Durfee—34A, 45A. Previously known only from the type locality in Trousdale County, Tennessee (Kondratieff and Durfee, 1995), additional material has been collected by the senior author from Holt Creek in Williamson County.
*Paraleptophlebia moerens* (McDunnough)—82A.
*Paraleptophlebia mollis* (Eaton)—87A.

**Superfamily Ephemeroidea**

**Family Potamanthidae**

**Genus Anthopotamus McCafferty & Bae**

*Anthopotamus distinctus* (Traver)—23N, 35A, 81N, 87NA.
*Anthopotamus myops* (Walsh)—33A, 41N, 66A, 87A.
*Anthopotamus neglectus disjunctus* Bae & McCafferty—32A, 38A, 39A, 66A.
*Anthopotamus verticis* (Say)—27N, 32A, 33A, 35NA, 38A, 39NA, 80A, 90N.

**Family Polymitarcidae**

**Genus Ephoron Williamson**


**Genus Tortopus Needham & Murphy**

*Tortopus puella* (Pictet)—No locality data given by Burks (1953; as *T. primus*) or McCafferty (1994). This species prefers streams and rivers with vertical clay banks; may represent a record from the Mississippi or Tennessee River (McCafferty, personal communication).

**Family Ephemeridae**

**Genus Ephemera Linnaeus**

*Ephemera blanda* Traver—88A, 89A.
*Ephemera guttulata* Pictet—62N, 72N, 78A, 87N, 89NA, 93NA.
*Ephemera simulans* Walker—6A, 56A.
Ephemera vari a Eaton—26N, 29N, 41N, 48N, 60N, 61N, 62N, 87N, 89NA, 93A.

Genus Hexagenia Walsh

Hexagenia atr cauda McDunnough—88A, 89A, 91A, 93A.
Hexagenia rigida McDunnough—33A, 66A, 85A.

Genus Litobrancha McCafferty

Litobrancha recurvata (Morgan)—89N. Considered rare in the Southeast; found in small, swift cold-water streams with a silt and marl substrate (Morse et al. 1994). McCafferty (1994) listed this species as occurring in both Tennessee and North Carolina.

Genus Pentagenia Walsh

Pentagenia vittigera (Walsh)—5A, 52A.

Superfamily Prosopistomoidea
Family Baetiscidae
Genus Baetisca Walsh

Baetisca berneri Tarter & Kirchner—89N.
Baetisca carolina Traver—78N, 79NA, 89NA.
Baetisca giber a Berner—35/39N.
Baetisca lacustris McDunnough—60N.

Superfamily Caenoidea
Family Neoephemeridae
Genus Neoeph emera McDunnough

Neoeph emera purpurea (Traver)—72N, 78N.

Family Caenidae
Genus Amercaenis Provons ha & McCafferty

Amercaenis ridens (McDunnough)—33A, 87NA.

Genus Caenis Stephens

Caenis amica Hagen—10A, 47A, 56A, 61A, 87A.
Caenis aniceps Traver—41N, 66A, 74A.
Caenis diminuta diminit a Walker—10A.
Caenis hilaris (Say)—33A, 41N, 43A, 47A.
Caenis latipennis Banks—33NA, 34NA, 40N, 41N, 43A, 48N, 91A.
Caenis punctata McDunnough—29A, 34N, 48N.
Superfamily Ephemeroelloidea
Family Ephemeroellidae
Genus Drunella Needham

*Drunella allegheniensis* (Traver)—93N.
*Drunella cornuta* (Morgan)—87N.
*Drunella cornutella* (McDunnough)—78N, 79N, 87N, 89N, 90N, 91N.
*Drunella lata* (Morgan)—88N, 89N.
*Drunella longicornis* (Traver)—87N. Also known from North Carolina (Berner, 1977) and Virginia (Kondratieff and Vosbell 1983); it is considered restricted to pristine riffle habitats (Morse, et al. 1993).
*Drunella tuberculata* (Morgan)—87N, 89N.
*Drunella wayah* (Traver)—79N. This species is known from North Carolina, Georgia (Berner, 1977) and Virginia (Kondratieff and Vosbell, 1983). It is found in sand-gravel substrates with moderate currents (Morse et al. 1994).

Genus *Ephemera* Walton

*Ephemera bernerii* Allen & Edmunds—78N, 83A. This rare southeastern Appalachian species (Morse et al. 1994) is known only from Virginia, Georgia (Berner, 1977) and North Carolina, where it prefers clean medium-sized mountain streams (Lenat and Penrose, 1987). Kondratieff, et al. (1981) described the male imago of this species.

*Ephemera catawba* Traver—52N, 62N, 87N, 88N, 89N.
*Ephemera crenula* Allen & Edmunds—87N.
*Ephemera dorothea* Needham—56N, 57N, 60A, 87N, 88N.
*Ephemera hispida* Allen & Edmunds—87N.
*Ephemera inconstans* Traver—89N.
*Ephemera invata* (Walker)—41N, 48N, 50N, 56N, 74N, 78A, 79N, 84N, 87N, 89N.
*Ephemera needhami* McDunnough—55A, 60A, 71A, 78N.
*Ephemera rossi* Allen & Edmunds—79N, 87N.
*Ephemera rotunda* Morgan—41N, 48N, 55A, 56A, 60A, 62N, 71A, 78NA, 87N, 89A. This species may be a complex of species or a widespread variable species which several other *Ephemera* species currently recognized as synonyms.
*Ephemera septentrionalis* McDunnough—78N, 56A.
*Ephemera subvaria* McDunnough—56N, 87N.

Genus *Eurylophella* Tiensuu

*Eurylophella aestival* (McDunnough)—25N, 62N.
*Eurylophella bicolor* (Clemens)—34N, 38N, 56N, 57N, 89N.
*Eurylophella enoensis* Funk—33N, 89N.
*Eurylophella funerals* (McDunnough)—41N, 48N, 32N, 56N, 69N, 80N, 87N, 89N.
*Eurylophella lutulenta* (Clemens)—41N, 48N, 33N, 56N, 62N.
*Eurylophella macdunnoughi* Funk—89N.
*Eurylophella minimella* (McDunnough)—32N, 69N, 84N, 89N.
*Eurylophella temporalis* (McDunnough)—25N, 41N, 48N, 56N, 60A, 71A, 88N.
Genus *Serratella* Edmunds

*Serratella carolina* (Berner & Allen)—87N. This riffle species is considered threatened in Alabama (Harris 1990) and the streams of the southern Appalachian Mountains (Morse et al. 1994).

*Serratella deficiens* (Morgan)—41N, 78N, 79N, 87N, 90N, 93N.

*Serratella serratoides* (McDunnough)—31N, 34N, 48N, 51N, 56N, 57N, 87N, 93N.

*Serratella sordida* (McDunnough)—62N.

*Serratella spiculosa* (Berner & Allen)—78N, 89N. This species is also reported from North Carolina (Berner 1977). Nymphs of this rare species collected by D. Etnier, University of Tennessee, were recently examined from Sams Creek, GSMNP, Blount County. This species is formally listed as Category 2 by United States Fish and Wildlife Service (Morse, et al. 1994).

Genus *Timpanoga* Needham

*Timpanoga simplex* (McDunnough)—56N, 87N.

Family Leptophyphidae

Genus *Tricorythodes* Ulmer

*Tricorythodes allectus* Needham—40A, 87A.

Infraorder Piscicorma

Family Ameletidae

Genus *Ameletus* Eaton

*Ameletus cryptostimus* Carle—62A, 92A. Considered a species of “special concern” in Virginia, where it is only found in pristine spring-fed streams of the older Appalachian Mountains (Kondratieff and Kirchner 1991)

*Ameletus lineatus* Traver—38N, 52N, 56A, 60N, 61A, 62N, 84NA, 87A. This species may be a synonym of *A. ludens* Needham.

Family Baetidae

Genus *Acentrella* Bengtsson

*Acentrella ampla* (Traver)—52N, 62NA.

*Acentrella turbida* (McDunnough)—30N, 31N, 33NA, 34NA, 41N, 45A, 48N, 79N, 87N, 88N, 90N.

Genus *Acerpenna* Waltz & McCafferty

*Acerpenna pygmaea* (Hagen)—18A, 33NA, 34NA, 41N, 48N, 63N, 72N, 81N, 82N, 89N. *Acerpenna hartii* (McDunnough) is a probable synonym.

Genus *Baetis* Leach

*Baetis cinctutus* McCafferty & Waltz—38A.

*Baetis flavistriga* McDunnough—33N, 41N, 48N, 78N, 87A, 89A.
*Baetis virile* (McDunnough)—41N, 48N. Known only from Canada (Needham, et al. 1934), Maine (Burian and Gibbs 1991), and recently Colorado (McCafferty, et al. 1993), this species is believed to be more widespread than collection records indicate (R. D. Waltz, pers. com.).

**Genus Callibaetis Eaton**

*Callibaetis ferrugineus ferrugineus* (Walsh)—No locality data given (Check 1982).

*Callibaetis floridanus* Banks—56A.

*Callibaetis fluctuans* (Walsh)—No locality data given (Check 1982).

*Callibaetis pretiosus* Banks—5A. Listed from Georgia and North Carolina (Berner 1977) and Virginia (Kondratieff and Voshell 1983). This species is considered threatened in the pools of mountain streams of the southern Appalachian Mountains (Morse, et al. 1994).

**Genus Centropilum Eaton**

*Centropilum alamance* (Traver)—33NA, 34NA, 41N, 48N, 62N, 87A, 89N.

**Genus Diphetor Waltz & McCafferty**

*Diphetor hagenii* (Eaton)—34N, 41N, 48N, 62N, 82N, 89N.

**Genus Heterocloeon McDunnough**

*Heterocloeon curiosum* (McDunnough)—90A. Reported from Georgia (Berner 1977), Virginia (Kondratieff and Voshell 1983) and Alabama, where it is considered threatened (Harris 1990).

*Heterocloeon petersi* (Müller-Liebenau)—89A. Also known from Georgia (Berner, 1977), North Carolina (Lenat and Penrose, 1987) and Virginia (Kondratieff and Voshell 1983); this species prefers well oxygenated medium-sized to large streams of the southern Appalachians (Morse et al. 1994).

**Genus Labiobaetis Novikova & Kluge**

*Labiobaetis ephippiatus* (Traver)—78A.

*Labiobaetis frondalis* (McDunnough)—89A.

*Labiobaetis propinquus* (Walsh)—66A.

**Family Siphlonuridae**

**Genus Siphlonurus Eaton**

*Siphlonurus mirus* Eaton—95A.

*Siphlonurus quebecensis* (Provanche)—56N, 61A, 62N, 89A.
Suborder Setisura
Family Isonychiidae
Genus Isonychia Eaton

Isonychia diversa Traver—80A. This species may be extinct, with only two specimens known, both collected in 1916.
Isonychia obscura Traver—89A.
Isonychia serrata Traver—61A. Reported from Georgia, North Carolina (Berner 1977) and Virginia, where it is a species of “special concern” (Kondratieff and Kirchner 1991).
Isonychia similis Traver—87A, 89A. Also known from North Carolina, South Carolina (Berner 1977) and Virginia (Kondratieff and Vesshell 1983) and is listed as threatened in Alabama (Harris 1990).
Isonychia tusculanensis Berner—79A, 89NA. Also known from Virginia, where it is considered a species of “special concern” (Kondratieff and Kirchner 1991). Few recent records are available for Tennessee. This species no longer occurs at its type locality and nearby streams.

Family Pseudironidae
Genus Pseudiron McDunnough

Pseudiron centralis McDunnough—5A, 93A. Listed as threatened in Alabama (Harris 1990) and Florida (Peters 1994) and is considered a species of “special concern” in Virginia (Kondratieff and Kirchner 1991). It is found primarily in the shifting sand substrates in the deeper, swifter parts of rivers (Edmunds, et al. 1976, Kondratieff and Kirchner 1991, Peters 1994).

Family Heptageniidae
Genus Cinygmula McDunnough

Cinygmula subequalis (Banks)—21N, 29N, 50N, 52N, 88A.

Genus Epeorus Eaton

Epeorus dispar (Traver)—93A.
Epeorus pleuralis (Banks)—78A, 87NA, 93A.
Epeorus rubidus (Traver)—41N, 48N, 82N, 88A, 89N, 90N, 91N.
Epeorus subpalidus (Traver)—37A. Also reported from Georgia and North Carolina (Berner, 1977). Found in moderate to fast currents and mixed substrates; a scraper of periphyton (Morse et al. 1994).
Epeorus vitreus (Walker)—78A.

Genus Heptagenia Walsh

Heptagenia marginolis Banks—61A.
Heptagenia townesi Traver—87A.

Genus Leucrocota Flowers

Leucrocota aphrodisia (McDunnough)—29NA, 32A, 33A, 38N, 41N, 48N, 87N
Leucrocota hebe (McDunnough)—34N, 38A, 62N, 66A, 64NA, 87A, 89A.
Leucrocuta juno (McDunnough)—31N, 87N, 90N.
Leucrocuta maculipennis (Walsh)—80A.
Leucrocuta minerua (McDunnough)—87A.
Leucrocuta thetis (Traver)—89N

Genus Macdunnoua Lehmkuhl

*Macdunnoua brunnea* Flowers—89A. Also known from Alabama, where it is listed as threatened (Harris, 1990).
*Macdunnoua persimplex* (McDunnough)—5A. Also known from Alabama, where it is listed as threatened (Harris 1990).

Genus Raptoheptagina Whiting & Lehmkuhl

*Raptoheptagina crucentata* (Walsh)—5A.

Genus Rhithrogena Eaton

*Rhithrogena exilis* Traver 79A.—Previously reported from Georgia and North Carolina (Berner 1977). Found in moderate to fast currents and mixed substrates; feeds on periphyton that requires an open canopy (Morse et al. 1994).

*Rhithrogena pellucida* Daggy—41N, 48N, 90A.

Genus Stenacron Jensen

*Stenacron carolina* (Banks)—87A, 88A, 89A, 92A.
*Stenacron gildersleevei* (Traver)—70A.

Genus Stenonema Traver

*Stenonema carlsoni* Lewis—87N. Also recorded from Georgia and South Carolina (Berner 1977) and favors high water quality (Morse et al. 1993).
*Stenonema exiguum* Traver.—34N, 35N, 38A, 66A, 78A, 87A.
*Stenonema medipunctatum* (McDunnough)—27N, 35A, 40N, 41N, 48N, 56N, 57N, 84N, 86N, 87N, 90N.
*Stenonema mexicanum integrum* (McDunnough)—5A, 22A, 34A, 56N, 78A, 87A.
Stenonema pudicum (Hagen)—52N, 57N, 62N, 70N, 72N, 79A, 87N, 88A, 89NA, 93A.
Stenonema pulchellum (Walsh)—34N, 55A, 56N, 57N, 90N.
Stenonema sinclari Lewis—52N, 64N.
Stenonema terminatum terminatum (Walsh)—32A, 33NA, 34NA, 38A, 56N, 57N.
Stenonema vicarium (Walker)—48N, 56N, 57N, 62A, 71A, 88A, 89A.

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