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

L. S. Long and B. C. Kondratieff

ABSTRACT

One hundred and forty-three species of mayflies are reported from the state of Tennessee. Sixteen species (Ameletus cryptostimulus, Choroterpes basalis, Baetis virile, Ephemera blanda, E. simulans, Ephemera berneri, Heterocloeon curiosum, H. petersi, Labiobaetis ephippiatus, Leptophlebia bradleyi, Macdunnoa brunnea, Paraleptophlebia assimilis, P. debilis, P. malulis, Rhithrogenia 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presented herein follows the classification of McCafferty (1996) and includes previous collection records, as well as unpublished records of the senior author or material deposited in the C. P. Gillette Museum of Arthropod Diversity, Colorado State University.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 (Habrophlebioides 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).

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Nineteen species known from Tennessee are considered threatened or vulnerable to extripation 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**

*Habrophlebiodes americana* (Banks)—18A, 71A, 87A, 88A, 89A, 90A.  
*Habrophlebiodes celeteria* Berner—77A, 93NA.

**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 jeanae* 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 Ephemerella** Linnaeus

*Ephemerella blanda* Traver—88A, 89A.

*Ephemerella guttulata* Pictet—62N, 72N, 78A, 87N, 89NA, 93NA.

*Ephemerella simulans* Walker—6A, 56A.
Ephemera varia Eaton—26N, 29N, 41N, 48N, 60N, 61N, 62N, 87N, 89NA, 93A.

**Genus Hexagenia Walsh**

*Hexagenia* atrocaudata 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 Prosopistomatoidea**  
**Family Baetiscidae**  
**Genus Baetisca Walsh**

*Baetisca bernerii* Tarter & Kirchner—89N.  
*Baetisca carolina* Traver—78N, 79NA, 89NA.  
*Baetisca gibbera* Berner—35/39N.  
*Baetisca lacustris* McDunnough—60N.

**Superfamily Caenoidea**  
**Family Neoephemeridae**  
**Genus Neoephemera McDunnough**

*Neoephemera purpurea* (Traver)—72N, 78N.

**Family Caenidae**  
**Genus Amercaenis Provonsha & McCafferty**

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

**Genus Caenis Stephens**

*Caenis amica* Hagen—10A, 47A, 56A, 61A, 87A.  
*Caenis anceps* Traver—41N, 66A, 74A.  
*Caenis diminuta diminuta* 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 Ephemerelloidea
   Family Ephemerellidae
   Genus Drunella Needham

   Drunella allegheniensis (Traver)—93N.
   Drunella cornuta (Morgan)—87N.
   Drunella cornutella (McDunnough)—78N, 79N, 87N, 89N, 90N, 91N.
   Drunella lata (Morgan)—88N, 89NA.
   Drunella longicornis (Traver)—87N. Also known from North Carolina (Berner, 1977) and Virginia (Kondratieff and Voshell 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 Voshell, 1983). It is found in sand-gravel substrates with moderate currents (Morse et al. 1994).

   Genus Ephemerella Walsh

   *Ephemerella 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.
   Ephemerella catawba Traver—52N, 62N, 87N, 88N, 89N.
   Ephemerella crenula Allen & Edmunds—87N.
   Ephemerella dorothea Needham—56N, 57N, 60A, 87N, 88N.
   Ephemerella hispida Allen & Edmunds—87N.
   Ephemerella inconstans Traver—89N.
   Ephemerella invaria (Walker)—41N, 48N, 50N, 56N, 74N, 78A, 79N, 84N, 87N, 89N
   Ephemerella needhami McDunnough—55A, 60A, 71A, 78N.
   Ephemerella rossi Allen & Edmunds—79N, 87N.
   Ephemerella 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 *Ephemerella* species currently recognized as synonyms.
   Ephemerella septentrionalis McDunnough—78N, 56A.
   Ephemerella subvaria McDunnough—56N, 57N.

   Genus Eurylophella Tiensuu

   Eurylophella aestiva (McDunnough)—25N, 63N.
   Eurylophella bicolor (Clemens)—34N, 38N, 56N, 57N, 89N.
   Eurylophella enoensis Funk—33N, 89N.
   Eurylophella funeralis (McDunnough)—41N, 48N, 32N, 56N, 69N, 80N, 87N, 89N.
   Eurylophella lutulenta (Clemmens)—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 serratoidea* (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 Sarns 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 Pisciforma

Family Ameletidae

Genus Ameletus Eaton

*Ameletus cryptostimulus* 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 intercalaris McDunnough—33N, 34N, 41N, 48N, 74A.
Baetis punctiventris (McDunnough)—34N, 87A.
Baetis rubrolaterale (McDunnough)—87A.
Baetis tricaudatus (McDunnough)—41N, 48N, 82NA, 86N, 87NA, 89A, 93A.
Baetis veteris (McDunnough)—60A.
*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 Centroptilum Eaton
Centroptilum alamance (Traver)—33NA, 34NA, 41N, 48N, 62N, 87A, 89N.

Genus Diphetor Waltz & McCafferty
Diphetor hageni (Eaton)—34N, 41N, 48N, 62A, 82N, 89A.

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 (Provancher)—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 Voshell 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 subaequalis (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 subpallidus (Traver)—87A. 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 marginalis Banks—61A.  
Heptagenia townesi Traver—87A.

Genus Leucrocuta Flowers  
Leucrocuta aphrodite (McDunnough)—29NA, 32A, 33A, 38N, 41N, 48N, 87N  
Leucrocuta hebe (McDunnough)—34N, 38A, 62N, 66A, 84NA, 87A, 89A.
Leucrocuta juno (McDunnough)—31N, 87N, 90N.
Leucrocuta maculipennis (Walsh)—80A.
Leucrocuta minerva (McDunnough)—87A.
Leucrocuta thetis (Traver)—89N.

**Genus Macdunnoa Lehmkuhl**

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

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

**Genus Raptoheptagenia Whiting & Lehmkuhl**

*Raptoheptagenia cruentata* (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 mediopunctatum* (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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LITERATURE CITED


