

MAYFLIES (EPHEMEROPTERA) OF NORTH CAROLINA
AND SOUTH CAROLINA: AN UPDATE

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ABSTRACT

A total of 204 valid species representing 56 genera in 18 families of mayflies are known to occur in North Carolina and South Carolina. Twenty-six of the 182 species of mayflies that are known from North Carolina are reported for the first time. South Carolina has 170 species of mayflies recorded, of which 26 are new state records. Taxonomic changes relevant to the mayfly fauna of both states are discussed.

RESUMEN

Un total de 204 especies válidas que representan 56 géneros en 18 familias de Ephemeroptera se encuentran en los estados de North Carolina y South Carolina. De las 182 especies de Ephemeroptera conocidas de North Carolina, 26 son reportadas por primera vez. South Carolina tiene 170 especies reportadas, de las cuales 26 son reportadas por primera vez. Se discuten los cambios taxonómicos concernientes a la fauna de los Ephemeroptera de ambos estados.

Unzicker and Carlson (1982) listed 184 species representing 45 genera in 16 families of mayflies known in North Carolina and South Carolina. Because they did not

indicate in which state each species occurred, one has to consult the literature to get such information. Since the publication of their list, there have been several taxonomic revisions of mayfly taxa, and species representing new state records and species new to science have been collected from both states. A total of 204 valid species representing 56 genera in 18 families of mayflies have been recorded from North Carolina and South Carolina. The list presented herein indicates that 182 valid species are known from North Carolina compared to 170 species from South Carolina. Twenty-six of the 182 species currently known from North Carolina are reported for the first time. Additionally, the taxonomic status of five unidentified species (*Acentrella* sp., *Amercaenis* sp., *Barbaetis* sp., *Paracloeodes* sp., and *Procloeon* sp.) from North Carolina are being investigated (Table 3). Twenty-six of the 170 species from South Carolina are reported for the first time. The main objective of this paper is to provide aquatic and conservation biologists with the current knowledge of the mayfly fauna of North Carolina and South Carolina, including the pertinent taxonomic and revisionary references for the group.

Significant taxonomic revisions on the supraspecific level are discussed relative to the mayfly composition of North Carolina and South Carolina. Nomenclatural changes of species in various taxa are briefly explained in the endnotes section. Table 2 lists the species that have been reported from North Carolina and South Carolina since the publication of the checklist of Unzicker and Carlson (1982). It also includes species that were published prior to, but were excluded from Unzicker and Carlson's list. Species that represent new unpublished records for each state are listed in Table 3.

BAETIDAE

Recent redefinition of the generic concepts of the family Baetidae (McCafferty & Waltz 1990, 1995; Waltz & McCafferty 1987a, 1987b; Waltz et al. 1985) has drastically changed the composition of the baetid fauna of North Carolina and South Carolina. The six genera (*Baetis*, *Callibaetis*, *Centroptilum*, *Cloeon*, *Heterocloeon*, and *Pseudocloeon*) listed by Unzicker and Carlson (1982) have now increased to 12 genera (*Acentrella*, *Acerpenna*, *Baetis*, *Barbaetis*, *Callibaetis*, *Centroptilum*, *Dipheter*, *Heterocloeon*, *Labiobaetis*, *Paracloeodes*, *Procloeon*, and *Pseudocentroptiloides*). The genera *Cloeon* and *Pseudocloeon* no longer occur in either state. The only recognized Nearctic species of *Cloeon*, *C. cognatum*, is now known only from the Northeast and Midwest (McCafferty 1996). The *Pseudocloeon* species reported by Unzicker and Carlson (1982) have recently been transferred to the genus *Baetis* except for *P. carolina*, which is now considered a junior synonym of *Acentrella turbida* (McCafferty et al. 1994). Likewise, all the *Centroptilum* species in Unzicker and Carlson's list have been transferred to *Procloeon*. The genus currently has seven and six species known from North Carolina and South Carolina, respectively. *Procloeon pennulatum* was recently reported from North Carolina (McCafferty 1993), but its occurrence in the state is questionable and remains doubtful (Wiersema, pers. comm.). The genus *Centroptilum* is represented in North Carolina by two species: *C. alamanca* (= *Neocloeon alamanca*) and *C. triangulifer* (= *Cloeon triangulifer*). The latter also occurs in South Carolina (Table 1). See endnotes for more information on the taxonomic changes relative to the baetid fauna of both states.

EPHEMERELLIDAE

Unzicker and Carlson (1982) listed 36 species of Ephemerellidae in North Carolina or South Carolina, but the number has increased to 40 species (Table 1). Based on a

TABLE 1. LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
ACANTHAMETROPODIDAE			
<i>Acanthametropus pecatonica</i> (Burks)	X ^o		X
AMELETIDAE			
<i>Ameletus cryptostimulus</i> Carle		X ⁺	X ⁺
<i>A. lineatus</i> Traver	X	X	X
ARTHROPLEIDAE			
<i>Arthroplea bipunctata</i> McDunnough	X	X	X
BAETIDAE ¹			
<i>Acentrella ampla</i> (Traver)	X	X	X
<i>A. turbida</i> (Banks) ²		X	X
<i>Acentrella</i> sp.		X ⁺	
<i>Acerpenna macdunnoughi</i> (Ide)	X	X	X ^o
<i>A. pygmaea</i> (Hagen)	X	X	X
<i>Baetis alachua</i> (Berner)	X	X ⁺	X
<i>B. armillatus</i> McCafferty & Waltz	X	X ⁺	X
<i>B. bimaculatus</i> (Berner)	X	X ⁺	X
<i>B. brunneicolor</i> McDunnough	X	X	X
<i>B. cinctutus</i> McCafferty & Waltz		X ⁺	
<i>B. dubius</i> (Walsh)	X	X	X
<i>B. flavistriga</i> McDunnough		X ^o	X ⁺
<i>B. intercalaris</i> McDunnough	X	X	X
<i>B. pluto</i> McDunnough		X ^o	X ^o
<i>B. punctiventris</i> (McDunnough)		X	X
<i>B. tricaudatus</i> Dodds	X	X	X
<i>Barbaetis benfieldi</i> Kennedy		X ^o	X ⁺
<i>B. cestus</i> (Provonsha & McCafferty)		X ⁺	X ⁺
<i>Barbaetis</i> sp.		X ⁺	
<i>Callibaetis floridanus</i> Banks			X ⁺
<i>C. fluctuans</i> (Walsh)	X	X	X
<i>C. pretiosus</i> Banks	X	X	X
<i>Centroptilum alamance</i> (Traver)	X	X	X ^o
<i>C. triangulifer</i> (McDunnough)		X ⁺	
<i>Dipheter hageni</i> (Eaton)		X ^o	X ⁺

Unpublished new state records are marked by a plus sign (+); published records not included in or published since Unzicker and Carlson's (1982) checklist are indicated by (°); endnote numbers indicate notes of taxonomic changes and associated literature sources.

¹Generic placements in the Baetidae follow McCafferty & Waltz (1990).

²*Acentrella turbida* is a senior synonym (McCafferty et al. 1994) of *A. carolina* (Banks).

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>Heterocloeon bernerii</i> (Müller-Liebenau)			X ⁺
<i>H. curiosum</i> (McDunnough)	X		X
<i>H. petersi</i> (Müller-Liebenau)		X ^o	
<i>Labiobaetis ephippiatus</i> (Traver)	X	X ⁺	X
<i>L. frondalis</i> (McDunnough)	X	X	X ^o
<i>L. propinquus</i> (Walsh)	X	X	X
<i>Paracloeodes minutus</i> Daggy		X ⁺	
<i>Paracloeodes</i> sp.		X ⁺	
<i>Procloeon bellum</i> (McDunnough)	X		X
<i>P. fragile</i> (McDunnough)	X	X	X
<i>P. intermediale</i> (McDunnough)	X	X	X
<i>P. pennulatum</i> (Eaton)		X ^o	
<i>P. quaesitum</i> (McDunnough)	X	X	X
<i>P. rivulare</i> (Traver)		X ⁺	X ^o
<i>P. rubropictum</i> (McDunnough)	X	X	X
<i>P. rufostigatum</i> (McDunnough)		X ⁺	
<i>P. simile</i> (McDunnough)	X	X	X
<i>P. viridoculare</i> (Berner)	X	X	X
<i>Procloeon</i> sp.		X ⁺	
<i>Pseudocentropiloides usa</i> Waltz & McCafferty		X ⁺	
BAETISCIDAE			
<i>Baetisca becki</i> Schneider & Berner		X ⁺	
<i>B. bernerii</i> Tarter & Kirchner		X ^o	
<i>B. carolina</i> Traver	X	X	X
<i>B. gibbera</i> Berner	X	X ^o	X
<i>B. laurentina</i> McDunnough		X ^o	
<i>B. obesa</i> (Say)	X	X ^o	X
<i>B. rogersi</i> Berner	X		X
BEHNINGIIDAE			
<i>Dolania americana</i> Edmunds & Traver	X	X	X
CAENIDAE			
<i>Amercaenis</i> sp.		X ⁺	
<i>Brachycercus bernerii</i> Soldán			X ^o

Unpublished new state records are marked by a plus sign (+); published records not included in or published since Unzicker and Carlson's (1982) checklist are indicated by (°); endnote numbers indicate notes of taxonomic changes and associated literature sources.

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>B. flavus</i> Traver			X°
<i>B. maculatus</i> Berner		X+	
<i>B. nitidus</i> Traver	X	X	X
<i>Caenis amica</i> Hagen	X	X	X
<i>C. anceps</i> Traver		X+	
<i>C. diminuta</i> Walker	X	X	X
<i>C. hilaris</i> (Say)	X	X+	X
<i>C. latipennis</i> Banks		X°	X+
<i>C. maccafferti</i> Provonsha		X+	X°
<i>C. punctata</i> McDunnough		X°	X°
<i>Cercobrachys etowah</i> Soldán		X+	X+
EPHEMERELLIDAE			
<i>Attenella attenuata</i> (McDunnough)	X	X	X
<i>Drunella allegheniensis</i> Morgan	X	X	X°
<i>D. cornuta</i> (Morgan)	X	X	
<i>D. cornutella</i> (McDunnough)	X	X	X°
<i>D. lata</i> (Morgan)	X	X	X°
<i>D. longicornis</i> (Traver)	X	X	X+
<i>D. tuberculata</i> (Morgan) ³	X	X	X
<i>D. walkeri</i> (Eaton)	X	X	X°
<i>D. wayah</i> (Traver)	X	X	X°
<i>Ephemerella argo</i> Burks	X	X°	X
<i>E. auriwillii</i> (Bengtsson)		X+	
<i>E. beneri</i> Allen & Edmunds		X°	X°
<i>E. catawba</i> Traver	X	X	X
<i>E. choctawhatchee</i> Berner	X		X
<i>E. crenula</i> Allen & Edmunds	X	X	X+
<i>E. dorothea</i> Needham	X	X	X
<i>E. floripara</i> McCafferty		X+	X°
<i>E. hispida</i> Allen & Edmunds	X	X	X°
<i>E. inconstans</i> Traver	X	X	X
<i>E. invaria</i> (Walker)	X	X	X+
<i>E. needhami</i> McDunnough	X	X°	X
<i>E. rossi</i> Allen & Edmunds	X	X	X

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³*Drunella conestee* (Traver) is a southern clinal variant of *D. tuberculata*, and thus a junior synonym (McCafferty 1993).

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>E. rotunda</i> Morgan	X	X	X
<i>E. septentrionalis</i> McDunnough	X	X	X
<i>E. subvaria</i> McDunnough	X	X	
<i>Eurylophella aestiva</i> McDunnough		X ^o	
<i>E. bicolor</i> (Clemens)	X	X	X
<i>E. doris</i> (Traver) ⁴	X	X	X
<i>E. enoensis</i> Funk & Sweeney ⁵		X ^o	X ^o
<i>E. funeralis</i> McDunnough	X	X	X
<i>E. minimella</i> (McDunnough)	X	X	X
<i>E. prudentalis</i> (McDunnough)	X	X ⁺	X
<i>E. verisimilis</i> (McDunnough)	X	X	X
<i>Serratella carolina</i> (Berner & Allen)	X	X	X ⁺
<i>S. deficiens</i> (Morgan)	X	X	X
<i>S. serrata</i> (Morgan)	X	X	
<i>S. serratoides</i> (McDunnough)	X	X	X
<i>S. sordida</i> (McDunnough)	X	X	X ⁺
<i>S. spiculosa</i> (Berner & Allen)	X	X	X ⁺
<i>Timpanoga simplex</i> (McDunnough) ⁶	X	X	X
<i>T. lita</i> (Burks)	X	X	X ⁺
EPHEMERIDAE			
<i>Ephemera blanda</i> Traver	X	X	X
<i>E. guttulata</i> Pictet	X	X	X
<i>E. simulans</i> Walker	X	X	X
<i>E. varia</i> Eaton	X	X	X
<i>Hexagenia atrocaudata</i> McDunnough	X	X	X
<i>H. bilineata</i> (Say)	X	X	X
<i>H. limbata</i> (Serville) ⁷	X	X	X
<i>H. rigida</i> McDunnough	X	X	X
<i>Litobranchea recurvata</i> (Morgan)	X	X	X
HEPTAGENIIDAE			

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⁴Following Funk & Sweeney (1994), specimens of *Eurylophella* previously identified as *E. temporalis* from east and south of the Appalachians are *E. doris*, and *Ephemerella trilineata* (Berner) is a synonym of *E. doris*.

⁵Nymphs formerly assigned to *Eurylophella coxalis* (McDunnough) are *E. enoensis*; the nymph of *E. coxalis* is unknown (Funk & Sweeney 1994).

⁶*Danella* Edmunds is now recognized as a subgenus of *Timpanoga* (McCafferty & Wang 1994).

⁷*Hexagenia munda* Eaton was synonymized with *Hexagenia limbata* (McCafferty 1984), and their respective subspecies are generally considered ecophenotypes (McCafferty & Pereira 1984, McCafferty 1996).

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>Anepeorus simplex</i> (Walsh)			X
<i>Cinygmula subaequalis</i> (Banks)	X	X	X ⁺
<i>Epeorus dispar</i> Traver	X	X	X
<i>E. pleuralis</i> (Banks)	X	X	X ^o
<i>E. rubidus</i> Traver	X	X	X
<i>E. subpallidus</i> Traver	X	X	
<i>Heptagenia flavescens</i> (Walsh)	X		X
<i>H. marginalis</i> Banks	X	X	X
<i>H. pulla</i> (Clemens)	X	X	X ⁺
<i>H. townesi</i> Traver	X	X	X
<i>Leucrocuta aphrodite</i> (McDunnough) ⁸	X	X	X
<i>L. hebe</i> (McDunnough)	X	X	X ^o
<i>L. juno</i> (McDunnough)	X	X	
<i>L. maculipennis</i> (McDunnough)	X		X
<i>L. thetis</i> (Traver)	X	X	X
<i>Macdunnoa brunnea</i> Flowers		X ^o	X ^o
<i>Nixe spinosa</i> (Traver) ⁹	X	X	
<i>Rhithrogena amica</i> Traver	X	X	X ⁺
<i>R. exilis</i> Traver	X	X	
<i>R. fasciata</i> Traver	X	X	X
<i>R. fuscifrons</i> Traver	X	X	X ⁺
<i>R. pellucida</i> Daggy			X ⁺
<i>R. rubicunda</i> Traver	X	X	
<i>R. uhari</i> Traver	X	X	X
<i>Stenacron carolina</i> (Banks)	X	X	X
<i>S. interpunctatum</i> (Say) ¹⁰	X	X	X
<i>S. pallidum</i> (Traver)	X	X	X ⁺
<i>Stenonema carlsoni</i> Lewis	X	X ⁺	X
<i>S. exiguum</i> Traver	X	X	X
<i>S. femoratum</i> (Say)	X	X	X
<i>S. mexicanum integrum</i> (McDunnough)	X	X	X
<i>S. ithaca</i> (Clemens & Leonard)		X	X

Unpublished new state records are marked by a plus sign (+); published records not included in or published since Unzicker and Carlson's (1982) checklist are indicated by (°); endnote numbers indicate notes of taxonomic changes and associated literature sources.

⁸*Leucrocuta* Flowers was established for the *maculipennis* group of the genus *Heptagenia* Walsh (Flowers 1980).

⁹*Nixe* Flowers was established for the *lucidipennis* and *simplicioides* species-groups of *Heptagenia* (Flowers 1980).

¹⁰Subspecies of *Stenacron interpunctatum* are no longer recognized (McCafferty & Pereira 1984).

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>S. lenati</i> McCafferty		X ^o	X ⁺
<i>S. meririvulanum</i> Carle & Lewis			X ^o
<i>S. modestum</i> (Banks)	X	X	X
<i>S. pudicum</i> (Hagen)	X	X	X
<i>S. sinclairi</i> Lewis			X ⁺
<i>S. terminatum</i> (Walsh)	X	X	X
<i>S. vicarium</i> (Walker)	X	X	X ^o
ISONYCHIIDAE ¹¹			
<i>Isonychia arida</i> (Say)	X		X
<i>I. bicolor</i> (Walker)	X	X	X
<i>I. georgiae</i> McDunnough		X ^o	X ^o
<i>I. notata</i> Traver	X	X	
<i>I. obscura</i> Traver	X	X	
<i>I. sayi</i> Burks			X ^o
<i>I. serrata</i> Traver	X	X	
<i>I. similis</i> Traver	X	X	X
LEPTOHYPHIDAE			
<i>Leptohyphes dolani</i> Allen	X	X ⁺	X
<i>L. robacki</i> Allen	X		X
<i>Tricorythodes albilineatus</i> Berner	X		X
<i>T. allectus</i> (Needham)	X	X	
<i>T. stygiatus</i> McDunnough	X	X	
LEPTOPHLEBIIDAE			
<i>Choroterpes basalis</i> (Banks) ¹²	X	X	X
<i>Habrophlebia vibrans</i> Needham	X	X	X
<i>Habrophlebiodes americana</i> (Banks)	X	X	X
<i>H. brunneipennis</i> Berner	X		X
<i>Leptophlebia austrina</i> (Traver)	X	X	X
<i>L. bradleyi</i> (Needham)		X ^o	X ^o
<i>L. collina</i> (Traver)	X	X	X
<i>L. cupida</i> (Say)	X	X	X ^o

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¹¹The following synonyms in *Isonychia* were given by Kondratieff & Voshell (1984): *I. pictipes* Traver is a synonym of *I. arida*; *I. fattigi* Traver, *I. matilda* Traver, *I. paceolata* Traver, and *I. sadleri* Traver are all synonyms of *I. bicolor*; *I. annulata* Traver and *I. thalia* Traver are synonyms of *I. georgiae*; *I. aurea* Traver is a synonym of *I. similis*.

¹²*Choroterpes hubbelli* has been synonymized with *C. basalis* (Banks) (Burian 1995).

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>L. grandis</i> (Traver)	X	X	
<i>L. intermedia</i> (Traver)	X	X	X
<i>L. johnsoni</i> McDunnough	X	X	
<i>Paraleptophlebia adoptiva</i> McDunnough	X	X	X°
<i>P. assimilis</i> (Banks)	X	X	X
<i>P. debilis</i> (Walker)	X	X	X°
<i>P. guttata</i> (McDunnough)	X	X	X
<i>P. jeanae</i> Berner	X		X
<i>P. moerens</i> (McDunnough)	X	X	
<i>P. mollis</i> (Eaton)	X	X	X+
<i>P. swannanoa</i> (Traver)	X	X	X
<i>P. volitans</i> (McDunnough)	X	X	X
METRETOPODIDAE			
<i>Siphloplecton basale</i> (Walker)	X	X	X°
<i>S. costalense</i> Spieth		X+	
<i>S. simile</i> Berner			X+
<i>Siphloplecton</i> sp. No.1 Traver ¹³	X	X	
NEOEPHEMERIDAE			
<i>Neoephemera purpurea</i> (Traver)	X	X	X
<i>N. youngi</i> Berner	X	X°	X
OLIGONEURIIDAE			
<i>Homoeoneura cahabensis</i> Pescador & Peters		X°	
<i>H. dolani</i> Edmunds, Berner & Traver	X	X°	X
POLYMITARCYIDAE			
<i>Ephoron leukon</i> Williams	X	X	X
<i>Tortopus puella</i> (Pictet) ¹⁴	X	X°	X
POTAMANTHIDAE			
<i>Anthopotamus distinctus</i> (Traver) ¹⁵	X	X	X°
<i>A. verticis</i> (Say)		X+	
PSEUDIRONIDAE			

Unpublished new state records are marked by a plus sign (+); published records not included in or published since Unzicker and Carlson's (1982) checklist are indicated by (°); endnote numbers indicate notes of taxonomic changes and associated literature sources.

¹³Nymphs identified as *Siphloplecton* sp. No. 1 of Traver probably are *S. costalense* (see Berner 1977).

¹⁴McCafferty (1996) has synonymized *Tortopus incertus* (Traver) with *T. puella* (Pictet).

¹⁵The genus *Anthopotamus* was established for the North American species previously placed in the genus *Potamanthus* Pictet (McCafferty & Bae 1990).

TABLE 1. (CONTINUED) LIST OF MAYFLIES (EPHEMEROPTERA) FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC).

TAXON	Unzicker & Carlson 1982	NC	SC
<i>Pseudiron centralis</i> McDunnough ¹⁶		X ⁺	X [°]
SIPHLONURIDAE			
<i>Siphonurus decorus</i> Traver	X	X	X
<i>S. luridipennis</i> (Burmeister)	X	X	
<i>S. marginatus</i> Traver	X	X	X [°]
<i>S. mirus</i> Eaton	X	X	X
<i>S. quebecensis</i> (Provancher)	X	X	X

Unpublished new state records are marked by a plus sign (+); published records not included in or published since Unzicker and Carlson's (1982) checklist are indicated by (°); endnote numbers indicate notes of taxonomic changes and associated literature sources.

¹⁶*Pseudiron meridionalis* Traver is a synonym of *P. centralis* (Pescador 1985).

recent revision of the genus *Eurylophella* (Funk and Sweeney 1994), some species (e.g., *E. coxalis*, *E. lutulenta*, and *E. trilineata*) listed by Unzicker and Carlson do not occur in North Carolina or South Carolina. *Eurylophella lutulenta* was previously reported in North Carolina (Berner 1977, Unzicker & Carlson 1982) but records south of 43°N Latitude are questionable and at least some of the southern records represent *E. enoensis* (Funk and Sweeney 1994). The list of *Ephemerella* species in Unzicker and Carlson (1982) remains the same, except for the addition of *Ephemerella berneri* and *E. floripara*. Both North Carolina and South Carolina have a high species diversity of *Ephemerella*. Taxonomic keys available for identifying nymphs to species, however, must be used with caution. Characters such as submedian abdominal tubercles or protuberances are invariably related to development or growth, and consequently are highly variable and unreliable. Additionally, taxonomic characters such as banding of the legs, and the density and arrangements of abdominal spicules, are confusing unless comparative specimens of the various species are available. A comprehensive revision of the genus is necessary to resolve such taxonomic difficulties.

HEPTAGENIIDAE

The family Heptageniidae is another group that recently has undergone significant taxonomic changes. *Arthroplea bipunctata* and *Pseudiron centralis*, previously placed in the Heptageniidae, have been transferred to Arthropleidae and Pseudironiidae, respectively (McCafferty 1991, Wang & McCafferty 1995). The Nearctic species of *Heptagenia* are now divided into three genera: *Heptagenia*, *Leucrocuta*, and *Nixe* (Flowers 1980) (see endnotes for further information). Four of the 13 Nearctic species of *Heptagenia*, five of the 10 species of *Leucrocuta*, and one of the 15 known *Nixe* species occur in North Carolina or South Carolina. Unzicker and Carlson's (1982) subspecies of *Stenacron interpunctatum* are no longer recognized (McCafferty 1996; McCafferty and Pereira 1984).

TABLE 2. MAYFLY SPECIES THAT HAVE BEEN REPORTED IN THE LITERATURE FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC) BY VARIOUS WORKERS SINCE THE PUBLICATION OF, OR NOT REPORTED IN, UNZICKER AND CARLSON'S (1982) CHECKLIST.

TAXON	SOURCE	NC	SC
BAETIDAE			
<i>Acerpenna macdunnoughi</i>	Carlson (1981)		X
<i>Baetis flavistriga</i>	Lenat & Penrose (1987)	X	
<i>B. pluto</i>	Carlson (1981), Lenat (1983)	X	X
<i>Barbaetis benfieldi</i>	Lenat & Penrose (1987)	X	
<i>Centroptilum alamanca</i>	Carlson (1981)		X
<i>Dipheter hageni</i>	Lenat & Penrose (1987)	X	
<i>Heterocloeon petersi</i>	Lenat & Penrose (1987)	X	
<i>Labiobaetis frondalis</i>	Carlson (1981)		X
<i>Procloeon pennulatum</i>	McCafferty (1993)	X	
<i>P. rivulare</i>	Carlson (1977)		X
BAETISCIDAE			
<i>Baetisca bernerii</i>	Penrose et al. (1982)	X	
<i>B. gibbera</i>	Lenat & Penrose (1987)	X	
<i>B. laurentina</i>	Lenat & Penrose (1987)	X	
<i>B. obesa</i>	Lenat & Penrose (1987)	X	
CAENIDAE			
<i>Brachycercus bernerii</i>	Soldán (1986)		X
<i>B. flavus</i>	Soldán (1986)		X
<i>Caenis latipennis</i>	Provonsha (1990)	X	
<i>C. maccafferti</i>	Provonsha (1990)		X
<i>C. punctata</i>	Provonsha (1990)	X	X
EPHEMERELLIDAE			
<i>Drunella allegheniensis</i>	Carlson (1981)		X
<i>D. cornutella</i>	Carlson (1981)		X
<i>D. lata</i>	Carlson (1981)		X
<i>D. walkeri</i>	Carlson (1981)		X
<i>D. wayah</i>	Carlson (1981)		X
<i>Ephemerella argo</i>	Lenat & Penrose (1987)	X	
<i>E. bernerii</i>	Carlson (1981), Penrose et al. (1982)	X	X
<i>E. floripara</i>	McCafferty (1985)		X
<i>E. hispida</i>	Carlson (1981)		X
<i>E. needhami</i>	Lenat & Penrose (1987)	X	
<i>Eurylophella aestiva</i>	Funk & Sweeney (1994)	X	
<i>E. enoensis</i>	Funk & Sweeney (1994)	X	X

TABLE 2. (CONTINUED) MAYFLY SPECIES THAT HAVE BEEN REPORTED IN THE LITERATURE FROM NORTH CAROLINA (NC) AND SOUTH CAROLINA (SC) BY VARIOUS WORKERS SINCE THE PUBLICATION OF, OR NOT REPORTED IN, UNZICKER AND CARLSON'S (1982) CHECKLIST.

TAXON	SOURCE	NC	SC
HEPTAGENIIDAE			
<i>Epeorus pleuralis</i>	Carlson (1981)		X
<i>Leucrocuta hebe</i>	Carlson (1981)		X
<i>Macdunnoa brunnea</i>	Flowers (1982)	X	X
<i>Stenonema lenati</i>	McCafferty (1990)	X	
<i>S. meririvulanum</i>	Carle & Lewis (1978)		X
<i>S. vicarium</i>	Carlson (1981)		X
ISONYCHIIDAE			
<i>Isonychia georgiae</i>	Kondratieff & Voshell (1984), Daniel & Morse (1992)	X	X
<i>I. sayi</i>	Kondratieff & Voshell (1984)		X
LEPTOPHLEBIIDAE			
<i>Leptophlebia bradleyi</i>	Carlson (1981), Lenat & Penrose (1987)	X	X
<i>L. cupida</i>	Carlson (1981)		X
<i>Paraleptophlebia adoptiva</i>	Carlson (1981)		X
<i>P. debilis</i>	Carlson (1981)		X
METRETOPODIDAE			
<i>Siphloplecton basale</i>	Carlson (1981)		X
NEOEPHEMERIDAE			
<i>Neoephemera youngi</i>	Lenat & Penrose (1987)	X	
OLIGONEURIIDAE			
<i>Homoeoneuria cahabensis</i>	Lenat and Penrose (1987)	X	
<i>H. dolani</i>	Finn and Herlong (1980)	X	
POLYMITARCYIDAE			
<i>Tortopus puella</i>	Lenat and Penrose (1987)	X	
POTAMANTHIDAE			
<i>Anthopotamus distinctus</i>	Carlson (1981)		X
PSEUDIRONIDAE			
<i>Pseudiron centralis</i>	Berner (1977)		X
SIPHONURIDAE			
<i>Siphonurus marginatus</i>	Carlson (1981)		X

TABLE 3. RECENTLY IDENTIFIED MAYFLIES THAT ARE NEW RECORDS FOR NORTH CAROLINA AND SOUTH CAROLINA BUT REMAIN UNREPORTED IN THE LITERATURE. THE SPECIES THAT ARE PRESUMABLY NEW AND UNPUBLISHED ARE LISTED AS "SP."

TAXON	IDENTIFIER	NC	SC
AMELETIDAE			
<i>Ameletus cryptostimulus</i>	B. C. Kondratieff & S. Spichiger	X	X
BAETIDAE			
<i>Acentrella</i> sp.	R. D. Waltz	X	
<i>Baetis alachua</i>	D. Lenat & R. D. Waltz	X	
<i>B. armillatus</i>	D. Lenat & R. D. Waltz	X	
<i>B. bimaculatus</i>	D. Lenat & R. D. Waltz	X	
<i>B. cinctutus</i>	D. Lenat & R. D. Waltz	X	
<i>B. flavistraga</i>	J. B. Glover		X
<i>Barbaetis benfieldi</i>	S. Spichiger		X
<i>B. cestus</i>	D. Lenat & S. Spichiger	X	X
<i>Barbaetis</i> sp.	R. D. Waltz	X	
<i>Callibaetis floridanus</i>	B. C. Kondratieff		X
<i>Centroptilum triangulifer</i>	R. D. Waltz	X	
<i>Dipheter hageni</i>	S. Spichiger		X
<i>Heterocloeon beneri</i>	S. Spichiger		X
<i>Labiobaetis ephippiatus</i>	D. Lenat & R. D. Waltz	X	
<i>Paracloeodes minutus</i>	R. D. Waltz	X	
<i>Paracloeodes</i> sp.	R. D. Waltz	X	
<i>Procloeon rivulare</i>	R. D. Waltz	X	
<i>Procloeon rufostrigatum</i>	N. Wiersema	X	
<i>Procloeon</i> sp.	N. Wiersema	X	
<i>Pseudocentroptiloides usa</i>	N. Wiersema	X	
BAETISCIDAE			
<i>Baetisca becki</i>	D. Lenat & M. L. Pescador	X	
CAENIDAE			
<i>Amercaenis</i> sp.	A. V. Provonsha	X	
<i>Brachycercus maculatus</i>	A. V. Provonsha	X	
<i>Caenis anceps</i>	A. V. Provonsha	X	
<i>C. hilaris</i>	A. V. Provonsha	X	
<i>C. latipennis</i>	J. B. Glover		X
<i>C. macafferti</i>	A. V. Provonsha	X	
<i>Cercobrachys etowah</i>	M. L. Pescador & J. B. Glover	X	X
EPHEMERELLIDAE			
<i>Drunella longicornis</i>	S. Spichiger		X
<i>Ephemerella aurivillii</i>	D. Lenat & M.L. Pescador	X	

TABLE 3. (CONTINUED) RECENTLY IDENTIFIED MAYFLIES THAT ARE NEW RECORDS FOR NORTH CAROLINA AND SOUTH CAROLINA BUT REMAIN UNREPORTED IN THE LITERATURE. THE SPECIES THAT ARE PRESUMABLY NEW AND UNPUBLISHED ARE LISTED AS "SP."

TAXON	IDENTIFIER	NC	SC
<i>E. crenula</i>	S. Spichiger		X
<i>E. floripara</i>	M. L. Pescador	X	
<i>E. invaria</i>	S. Spichiger		X
<i>E. prudentalis</i>	D. Lenat & D. H. Funk	X	
<i>Serratella carolina</i>	J. B. Glover		X
<i>S. sordida</i>	J. B. Glover		X
<i>S. spiculosa</i>	J. B. Glover		X
<i>Timpanoga lita</i>	S. Spichiger		X
HEPTAGENIIDAE	S. Spichiger		X
<i>Cinygmula subaequalis</i>	S. Spichiger		X
<i>Heptagenia pulla</i>	M. K. Griffin		X
<i>Rhithrogena amica</i>	S. Spichiger		X
<i>R. fuscifrons</i>	S. Spichiger		X
<i>R. pellucida</i>	B. C. Kondratieff		X
<i>Stenacron pallidum</i>	M. K. Griffin		X
<i>Stenonema carlsoni</i>	M. L. Pescador	X	
<i>S. lenati</i>	S. Spichiger		X
<i>S. sinclairi</i>	S. Spichiger		X
LEPTOHYPHIDAE			
<i>Leptohyphes dolani</i>	D. Lenat	X	
LEPTOPHLEBIIDAE			
<i>Paraleptophlebia mollis</i>	S. Spichiger		X
METRETPODIDAE			
<i>Siphloplecton costalense</i>	D. Stephan	X	
<i>S. simile</i>	B. C. Kondratieff		X
PSEUDIRONIDAE			
<i>Pseudiron centralis</i>	M.L. Pescador	X	
POTAMANTHIDAE			
<i>Anthopotamus verticis</i>	W. P. McCafferty	X	

ISONYCHIDAE AND OLIGONEURIIDAE

The recent resurrection of the monogeneric family Isonychiidae (McCafferty 1991a,b) has reduced the species composition of the oligoneuriid fauna of both states. Following Kondratieff and Voshell's (1984) revision of the genus *Isonychia*, a total of eight species are now known from North Carolina and South Carolina compared to the previous 15 species reported by Unzicker and Carlson (1982). The oligoneuriids

Homooneuria dolani and *H. cahabensis* both occur in North Carolina, with the former species also occurring in South Carolina.

POTAMANTHIDAE

The potamanthid *Anthopotamus verticis* has recently been reported from North Carolina (McCafferty 1994), increasing to two the number of *Anthopotamus* species known from that state; the other species is *A. distinctus*, which also occurs in South Carolina.

SIPHONURIDAE, ACANTHAMETROPODIDAE, AND AMELETIDAE

Some genera and species that were listed in the Siphonuridae by Unzicker and Carlson (1982) are no longer considered to belong to the family. The genus *Acanthametropus*, which is now placed in the family Acanthametropodidae, has one species, *A. peatonica*, occurring in South Carolina. The genus *Ameletus* (Ameletidae) is represented in North and South Carolina by *A. cryptostimulus* and *A. lineatus* (Table 1).

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