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Survey of Missouri Mayflies with the First Description of Adults of *Stenonema bednariki* (Ephemeroptera: Heptageniidae)

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ABSTRACT: From new and previous collections, eighty-five species of Ephemeroptera are reported from Missouri and fifty-one are new state records. With the addition of another seven previously published species, the known mayfly fauna of Missouri is ninety-two species. The previously unknown adults of *Stenonema bednariki* McCafferty are described for the first time.

Missouri has an area of 17,870,862 hectares with an impressive stream network that includes almost 19,308 km of permanently flowing streams and 14,642 km of streams that cease surface flow during prolonged dry periods but still provide permanent pools (Missouri Department of Natural Resources, 1986). The aquatic insect fauna of Missouri has not been closely studied. Despite the well-known studies for the neighboring state of Illinois (Burks, 1953; Frison, 1935, 1942; Ross, 1944), no comprehensive survey of the mayflies of Missouri is presently available.

Our inventory of the Ephemeroptera of Missouri is based upon previous and newly collected material and literature records. Voucher specimens are deposited in the W. R. Enns Entomology Museum, Department of Entomology, University of Missouri, Columbia (MU); C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, Colorado (CSU); and Purdue Entomological Research Collection, Department of Entomology, Purdue University, West Lafayette, Indiana (PERC).

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Published records (Burks, 1953; McCafferty and Provonsha, 1978; Klubertanz, 1995; McCafferty and Klubertanz, 1994; Peters and Warren, 1966) from states surrounding Missouri indicate that an additional twenty-nine species could be expected to be found in Missouri. These species include: *Baetis armillatus* McCafferty and Waltz, *Baetis brunneicolor* McDunnough, *Baetis cinctus* McCafferty and Waltz, *Camelobaetidius waltzi* McCafferty, *Procloeon rubropictum* (McDunnough), *Procloeon rufostrigatum* (McDunnough), *Procloeon walshi* (McDunnough), *Baetisca laurentina* McDunnough, *Caenis maccafferti* Provonsha, *Caenis tardata* McDunnough, *Caenis youngi* Roemhild, *Eurylophella macdunnoughi* Funk, *Serratella sordida* (McDunnough), *Timpanoga provonshai* (McCafferty), *Ephemera guttulata* Pictet, *Leucrocuta minerva* (McDunnough), *Leucrocuta umbratica* (McDunnough), *Nixe inconspicua* (McDunnough), *Raptoheptagenia cruentata* (Walsh), *Stenonema luteum* (Clemens), *Habrophlebiodes annulata* Traver, *Leptophlebia bradleyi* (Needham), *Paraleptophlebia guttata* (McDunnough), *Paraleptophlebia mollis* (Eaton), *Siphloplecton interlineatum* (Walsh), *Siphonurus marshalli* Traver, *Tricorythodes allectus* (Needham), *Tricorythodes curvatus* Allen, and *Tricorythodes stygiatus* McDunnough.

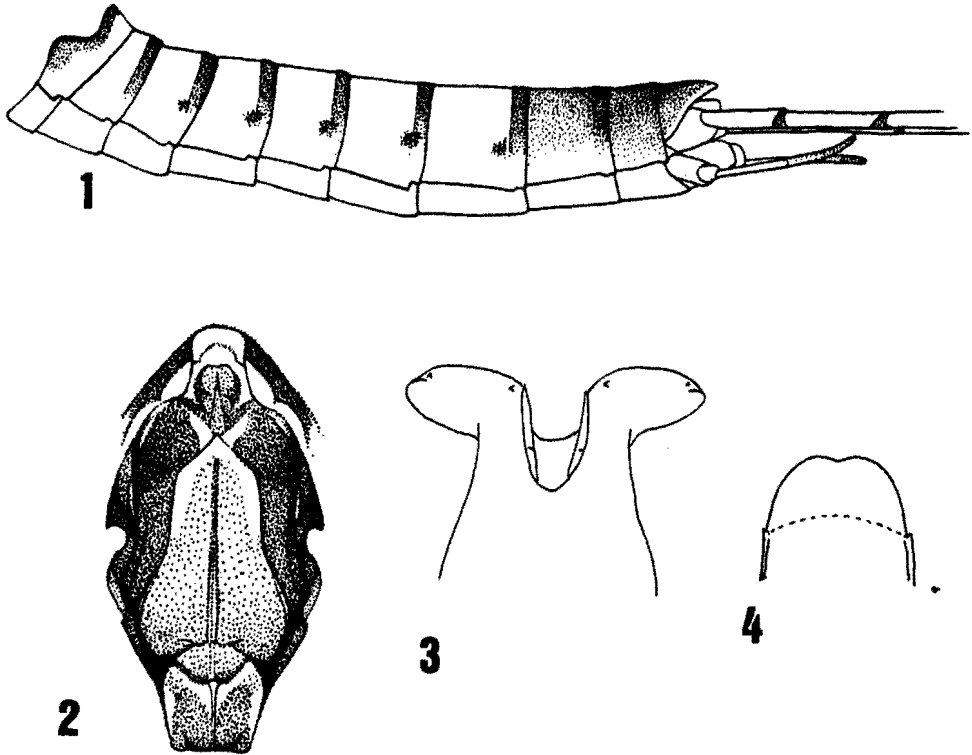
A list of the previously published and new records for mayfly species is presented. Ninety-two species are listed, fifty-one are considered new state records and are indicated by "*". Seven species are based solely on published records and are indicated with "#" symbols. We follow the family classification as presented by McCafferty (1996).

Ameletidae

- **Ameletus lineatus* Traver - Maries Co: Spring Cr., Rt. A S Vienna, III-5-1995, D. G. LeDoux & F. Lloyd, larvae (MU).
- **Ameletus ludens* Needham - Cedar Co: Horse Cr., S4 T34N R28W, III-22-1995, R. J. Sarver & S. Humphrey, larvae (MU).

Baetidae

- **Acentrella turbida* (McDunnough) - Franklin Co: Meramec R., Meramec St. Pk., V-29-1990, B. C. Kondratieff, larvae (CSU); Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, larvae (CSU); Hickory Co: Little Niangua R., NW¼ S2 T37N R20W, III-28-1993, larvae, R. J. Sarver (MU); McDonald Co: Big Sugar Cr., N¼ S21 T22N R30W, III-8-1993, R. J. Sarver, larvae (MU); Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, larvae (CSU); Phelps Co: Little Piney Cr., S32 T36N R8W, III-22-1996, R. J. Sarver & S. Humphrey, larvae (MU); Reynolds Co: East Fork Black R., Johnson's Shut-Ins State Park, III-7-1993, R. J. Sarver, larvae (MU); Ste. Genevieve Co: Saline Cr., W¼ S28 T36N R9E, III-23-1993, R. J. Sarver, larvae (MU).
- Acerpenna pygmaea* (Hagen) - Davies Co: Marrowbone Cr., S8 T58N R27W, IV-12-1993, R. J. Sarver, larvae (MU); DeKalb Co: Grindstone Cr., NW¼ S2 T58N R30W, IV-23-1993, R. J. Sarver, larvae (MU); Franklin Co: Meramec R., Meramec St. Pk., V-29-1990, B. C. Kondratieff, larvae (CSU); Phelps Co: Mill Cr., SW¼ S4 T36N R9W, III-29-1996, R. J. Sarver & S. Humphrey, larvae (MU); Ray Co: East Fork Crooked R., E½ S27 T53N R27W, IV-12-1993, R. J. Sarver, larvae (MU). Other records are available in Morihiro and McCafferty (1979).
- **Apobaetis indepressus* Day - Davies Co: Grand R., SE¼ S32 T59N R26W, VIII-25-1995, R. Wright, larvae (MU).
- **Baetis dubius* (Walsh) - Gasconade Co: Gasconade R., near Hwy. 63 bridge, V-4-1989, S. Humphrey, larvae (MU).
- **Baetis flavistriga* McDunnough - Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, larvae (CSU); Ozark Co: North Fork White R., Mo. Dept. Cons. Hammond Access, VI-29-1989, R. J. Sarver, larvae (MU).
- **Baetis intercalaris* McDunnough - Nodaway Co: Honey Cr., S24 T65N R34W, VIII-31-1993, R. J. Sarver, larvae (MU); St. Clair Co: Brush Cr., SE¼ S17 T35N R24W, IX-20-1995, R. J. Sarver & S. Humphrey, larvae (MU).
- **Baetis punctiventris* (McDunnough) - Ozark Co: North Fork White R., Hwy. PP bridge, IV-16-1989, R. J. Sarver, larvae (MU).
- Baetis tricaudatus* Dodds - Ozark Co: North Fork White R., Kelly Shoals 5 mi. SE Dora, VIII-5-1988, R. J. Sarver, larvae, V-16-1989, R. J. Sarver, adults (MU); Phelps Co: Little Piney Cr., SW¼ S32 T36N R8W, III-11-1993, R. J. Sarver, larvae (MU). Other records are available in Morihiro and McCafferty (1979).
- **Barbaetis cestus* (Provonsha and McCafferty) - Reynolds Co: West Fork Black R., S¼ S18 T32N R2E, IX-4-1996, R. J. Sarver, larvae (MU).



Figs. 1-4. *Stenonema bednarki*. 1. Male abdomen, lateral view. 2. Male thorax, dorsal view. 3. Male penes, dorsal view, 4. Female subanal plate, ventral view.

#*Callibaetis ferrugineus ferrugineus* (Walsh) - All records are from Check (1982).

#*Callibaetis floridanus* Banks - All records are from Check (1982).

Callibaetis fluctuans (Walsh) - Butler Co: Main Ditch, Co. Rd. 306 bridge, VIII-19-1992, R. J. Sarver, larvae (MU); Crawford Co: Huzzah Cr., Rt. V bridge, IV-9-1995, A. Bissing & F. Lloyd, larvae (MU); Saline Co: Missouri R., Mo. Dept. Cons. Grand Pass Conservation Area, VII-1993, K. Lesko, adults (MU). Other records are available in Check (1982).

Callibaetis skokianus Needham - Douglas Co: Topaz Spring Pond, 6 mi. SE Vanzant, III-24-1989, R. J. Sarver, adults (MU). Other records are available in Check (1982) and Traver (1935).

**Centroptilum alamance* (Traver) - Oregon Co: Eleven Point R., Hwy. 160 bridge, VIII-22-1979, D. Edwards, larvae (MU).

* *Centroptilum triangulifer* (McDunnough) - St. Clair Co: Brush Cr., SE $\frac{1}{4}$ S18 T36N R25W, III-30-1995, R. J. Sarver & S. Humphrey, larvae (MU & PERC).

Diphetero hageni (Eaton) - Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, larvae (CSU); Phelps Co: Little Piney Cr., S32 T36N R8W, III-22-1996, R. J. Sarver & S. Humphrey, larvae (MU); Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, larvae (CSU). Other records are available in Morihara and McCafferty (1979) as *Baetis hageni* Eaton.

#*Fallceon quilleri* (Dodds) - All records are from Morihara and McCafferty (1979) as *Baetis quilleri* Dodds.

**Labiobaetis ephippiatus* (Traver) - Livingston Co: Grand R., Hwy. 36 bridge, VII-12-1996, R. J. Sarver, adults reared (MU).

**Labiobaetis frondalis* (McDunnough) - Phelps Co: Little Piney Cr., S32 T36N R8W, IX-11-1996, R. J. Sarver & S. Humphrey, larvae (MU).

**Labiobaetis longipalpus* (Morihara and McCafferty) - Livingston Co: Grand R., VII-12-1996, R. J. Sarver, larvae (MU).

- **Labiobaetis propinquus* (Walsh) - Benton Co: Deer Cr., NE¼ S31 T40N R20W at Hastain, IX-22-1993, R. J. Sarver, larvae (MU); Dallas Co: Niangua R., Mo. Dept. Cons. Big John Access, V-18-1996, R. J. Sarver, larvae (MU); Pulaski Co: Roubidoux Cr., S24 T36N R12W @ Waynesville City Park, V-22-1996, R. J. Sarver, larvae (MU).
- **Paracloeodes minutus* (Daggy) - Livingston Co: Grand R., at Hwy. 36 bridge, VII-12-1996, R. J. Sarver, larvae (MU).
- **Procloeon album* (McDunnough) - Phelps Co: Little Piney Cr., S32 T36N R8W, III-22-1996, R. J. Sarver, larvae (MU & PERC); Pulaski Co: Roubidoux Cr., S24 T36N R12W @ Waynesville City Park, IV-22-1996, R. J. Sarver, larvae (MU & PERC).
- **Procloeon irrubrum* Lowen and Flannagan - Nodaway Co: Honey Cr., S13/24 T65N R34W, VIII-31-1993, R. J. Sarver, larvae (MU & PERC); Vernon Co: Little Dry Wood Cr., S18/19 T35N R31W, IX-21-1993, R. J. Sarver, larvae (MU & PERC).

Baetiscidae

- Baetisca lacustris* McDunnough - Madison Co: Marble Cr., S½ S18 T32N R5E, III-18-1993, R. J. Sarver, larvae (MU); Osage Co: Gasconade R., Pointers Creek Access, III-30-1989, S. Humphrey, larvae (MU). Other records are available in Pescador and Berner (1981).
- **Baetisca obesa* (Say) - Mississippi Co: Maple Slough Ditch, Township line 24N and 25N R15E, III-28-1994, R. J. Sarver, larvae (MU).

Caenidae

- **Amercaenis ridens* (Banks) - Cole Co: Missouri R., S22 T44N R11W at Jefferson City, VII-29-1995, R. J. Sarver, larvae, (PERC).
- **Brachycercus flavus* Traver - Davies Co: Marrowbone Cr., S8 T58N R27W, VIII-30-1993, R. J. Sarver, larvae (MU); Harrison Co: West Fork Big Cr., SW¼ S22 T64N R28W, VIII-31-1993, R. J. Sarver, larvae (MU); Maries Co: Gasconade R., near Hwy. 63 bridge, VI-5-1989, B. C. Poulton, larvae (MU); Nodaway Co: Honey Cr., S24, T64N R34W, VIII-31-1993, R. J. Sarver, larvae (CSU).
- **Caenis amica* Hagen - Clark Co: Rose Pond Natural Area, V-8-1994, D. G. LeDoux, larvae (MU).
- Caenis anceps* Traver - Hickory Co: Little Niangua R., NW¼ S2 T37N R20W, IX-14-1995, R. J. Sarver & S. Humphrey, larvae (MU); Ste. Genevieve Co: Saline Cr., W½ S28 T36N R9W, IX-9-1993, R. J. Sarver, larvae (MU). Other records available in Provonsha (1990).
- Caenis hilaris* (Say) - Cole Co: Missouri R., Jefferson City, VII-16-1996, R. J. Sarver, adults (MU); Lewis Co: Middle Fabius R., NE¼ S5 T61N R8W, VII-23-1993, R. J. Sarver, larvae (MU). Other available records in Provonsha (1990).
- Caenis latipennis* Banks - Callaway Co: Turkey Cr., SW¼ S4 T44N R11W, VII-10-1996, R. J. Sarver, adults reared (MU); Cooper Co: Petite Saline Cr., NE¼ S13 T48N R16W, VIII-25-1993, R. J. Sarver, larvae (MU); Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, larvae (CSU); Maries Co: Gasconade R., Paydown Access, VI-2-1989, S. Humphrey, larvae (MU). Other available records in Provonsha (1990).
- **Caenis punctata* McDunnough - Ray Co: East Fork Crooked R., E½ S27 T53N R27W, VIII-30-1993, R. J. Sarver, larvae (MU).

Ephemerellidae

- **Attenella attenuata* (McDunnough) - Osage Co: Gasconade R., Pointers Creek Access, VI-15-1990, B. C. Poulton, larvae (MU).
- Ephemerella invaria* (Walker) - Maries Co: Gasconade R., Hwy. 63 bridge, IV-30-1990, B. C. Poulton, reared (MU); Ozark Co: North Fork White R., Kelly Shoals 5 mi. SE Dora, V-16-1989, R. J. Sarver, adults (MU). Other records available in Allen and Edmunds (1965).
- #*Ephemerella dorothea* Needham - All records are from Allen and Edmunds (1965).
- Ephemerella needhami* McDunnough - Greene Co: Clear Cr., S4 T30N R24W, IV-3-96, R. J. Sarver & S. Humphrey, larvae (MU); Ozark Co: North Fork White R., Kelly Shoals 5 mi. SE Dora, V-16-1989, R. J. Sarver (MU). Other records available in Allen and Edmunds (1965).
- **Ephemerella subvaria* McDunnough - Ozark Co: North Fork White R., Missouri. Dept. Cons. Blair Bridge Access, III-25-1989, R. J. Sarver, larvae (MU).
- Eurylophella aestiva* (McDunnough) - Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, larvae (CSU); Iron Co: Carver Cr., S34 T32N R3E, V-17-1979, L. Trial, larvae (MU); Iron Co: Strother Cr., S35 T33N R1W, VI-13-1979, L. Trial, larvae (MU); Shannon Co: Mahans Cr., SW¼ S27 T29N R4W, VI-29-1981, L. Trial, larvae (MU). Other records available in Allen and Edmunds (1963b) and Funk and Sweeney (1994).

Eurylophella bicolor (Clemens) - Dallas Co: Niangua R., Missouri Dept. Cons. Big John Access, V-18-1996, R. J. Sarver, adults reared (MU); Maries Co: Gasconade R., Paydown Access, V-2-1989, S. Humphrey, larvae (MU); Maries Co: Gasconade R., near Hwy. 63 bridge, IV-30-1990, B. C. Poulton, larvae (MU). Other records available in Allen and Edmunds (1963b) and Funk and Sweeney (1994).

Eurylophella enoensis Funk - Maries Co: Spring Cr., Rt. A bridge, IV-8-1995, F. Lloyd, larvae (MU); Phelps Co: Gasconade R., Jerome Access, III-29-1990, B. C. Poulton, larvae (MU); Wayne Co: Bennett Cr., Hwy. 67 bridge at Lodi, IV-5-1990, B. C. Poulton, larvae (MU). Other records available in Funk and Sweeney (1994).

Missouri records published by Allen and Edmunds (1963b) for *Eurylophella lutulenta* (Clemens) and *Eurylophella temporalis* McDunnough are doubtful until specimens are reexamined using Funk and Sweeney (1994).

**Serratella deficiens* (Morgan) - Maries Co: Gasconade R., Hwy. 63 bridge, V-3-1989, S. Humphrey, larvae (MU); Ozark Co: Bryant Cr., V-24-1978, B. H. Tracy, larvae (MU); Ozark Co: North Fork White R., Missouri Dept. Cons. Blair Bridge Access, V-15-1989, R. J. Sarver, larvae (MU).

Serratella frisoni (McDunnough) - Maries Co: Gasconade R., 1 km below Rt. 42 bridge, VI-5-1989, B. C. Poulton, larvae (MU). Other records available in Allen and Edmunds (1963a).

**Serratella serratoides* (McDunnough) - Ozark Co: North Fork White R., Missouri Dept. Cons. Blair Bridge Access, VI-26-1989, R. J. Sarver (MU).

**Timpanoga lita* (Burks) - Maries Co: Gasconade R., Hwy. 63 bridge, V-3-1989, S. Humphrey, larvae (MU).

Ephemeridae

Ephemera simulans Walker - Douglas Co: North Fork White R., low water bridge between Hwy's. 76 and E, V-23-1989, R. J. Sarver, adults (MU); Polk Co: Pomme De Terre R., Hwy. D bridge, V-23-1986, B. C. Poulton, adults (MU). Other records available in McCafferty (1994).

#*Ephemera traverae* Spieth - All records are from McCafferty (1994).

Hexagenia atrocaudata McDunnough - Gasconade Co: Gasconade R., Helds Island Access, VIII-28-1990, B. C. Poulton, adults (MU); Maries Co: Gasconade R., Hwy. 63 bridge, IX-9-1990, B. C. Poulton, adults (MU); Ripley Co: Little Black R., N½ S25 T24N R3E, IX-7-1993, R. J. Sarver, adults (MU). Other records available in Spieth (1941) and McCafferty (1994).

Hexagenia bilineata (Say) - Cole Co: Missouri R., Jefferson City, VII-27-1995, R. J. Sarver, adults (MU). Lewis Co., Mississippi R., Fenway Landing, VI-24-1989, B. C. Kondratieff & M. Harris, adults (CSU). Other records available in Spieth (1941) and McCafferty (1994).

Hexagenia limbata Serville - Callaway Co: Pond, SE¼ SW¼ S27 T45N R11W, VII-22-1996, R. J. Sarver, adults reared (MU); Cole Co: Missouri R., Jefferson City, VIII-9-1995, R. J. Sarver, adult (MU); Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, larvae, adults (CSU); Sullivan Co: East Fork Locust Cr., SE¼ S35 T63N R20W, IX-8-1994, R. J. Sarver, adults (MU). Other records available in Spieth (1941) and McCafferty (1994).

Hexagenia rigida McDunnough - Cole Co: Missouri R., Jefferson City, VII-21-1996, R. J. Sarver, adults (MU); Maries Co: Gasconade R., Belle Chute Access, IV-24-1990, B. C. Poulton, adults (MU). Other records available in Spieth (1941) and McCafferty (1994).

Pentagenia vittigera (Walsh) - Boone Co: Missouri R., IV-15-1995, GWW, larvae (MU); Cole Co: Missouri R., Jefferson City, VIII-5-1995, R. J. Sarver, adults (MU). Other records available in Traver (1935) and McCafferty (1994).

Heptageniidae

**Heptagenia diabasia* Burks - Buchanan Co: Jenkins Cr., near Gower, X-26-1982, D. Edwards, larvae (MU); Holt Co: Nodaway R., W½ S2 T61N R37W, VII-6-1996, larvae (MU); Nodaway Co: White Cloud Cr., S19 T62N R35W, IV-22-1993, R. J. Sarver, larvae (MU); Ray Co: East Fork Crooked R., E½ S27 T53N R27W, IV-12-1993, R. J. Sarver, larvae (MU).

**Heptagenia flavescens* (Walsh) - Boone Co: Missouri R., Easley Access, II-5-1990, B. C. Poulton, larvae (MU); Cole Co: Missouri R., S22 T44N R11W, VII-31-1995, R. J. Sarver (MU).

**Leucrocota aphrodite* (McDunnough) - Lewis Co., Mississippi R., Fenway Landing, VI-24-1989, B. C. Kondratieff & M. Harris, adults (CSU); Maries Co: Gasconade R., near Hwy. 63 bridge, VI-5-1989, B. C. Poulton, larvae (MU).

**Leucrocota hebe* (McDunnough) - Holt Co: Nodaway R., W½ S2 T61N R37W, VI-7-1996, R. J. Sarver, larvae (MU).

Leucrocota maculipennis (Walsh) - Lawrence Co: Spring R., Verona MO, VIII-26-1986, S. Humphrey, larvae (MU); Nodaway Co: White Cloud Cr., S19 T62N R35W, IX-1-1993, R. J. Sarver, larvae (MU). Other records available in Traver (1935).

**Nixe perfida* (McDunnough) - Callaway Co: Turkey Cr., SE¼ SW¼ S27 T45N R11W, V-25-1996, R. J. Sarver, larvae & reared adults (MU).

**Rhithrogena pellucida* Daggy - Christian Co: Finley Cr., V-23-1978, B. H. Tracy (MU); Dallas Co: Niangua R., Missouri Dept. Cons. Big John Access, V-18-1996, R. J. Sarver, adults reared (MU); Douglas Co: North Fork White R., Hebron Access, V-1-1989, R. J. Sarver, larvae (MU); Maries Co: Gasconade R., near Rt. 42 bridge, V-2-1989, S. Humphrey, larvae (MU); Ozark Co: Bryant Cr., V-24-1978, B. H. Tracy, larvae (MU); Phelps Co: Little Piney Cr., 5 mi. S Veda, IV-7-1990, B. C. Poulton, larvae (MU).

**Stenacron interpunctatum* (Walker) - Franklin Co: Meramec R., Meramec St. Pk., V-29-1990, B. C. Kondratieff, adults (CSU); Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, larvae (CSU); Maries Co: Gasconade R., Hwy. 63 bridge, V-2-1989, S. Humphrey, larvae (MU); Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, larvae, adults (CSU); Nodaway Co: Honey Cr., S24 T65N R34W, IV-13-1993, R. J. Sarver (MU); Reynolds Co: Middle Fork Black R., S½ S17 T32N R2E, IX-20-1996, R. J. Sarver, adults (MU).

Stenonema bednariki McCafferty - McDonald Co: Big Sugar Cr., N½ S21 T22N R30W, III-8-1993, R. J. Sarver (MU); Reynolds Co: Middle Fork Black R., S½ S17 T32N R2E, IX-20-1996, R. J. Sarver, larvae and reared adults (CSU & PERC); Shannon Co: Jacks Fork R., S4 T28N R5W, XI-17-1981, L. Trial, larvae (MU). Other records are available in McCafferty (1981).

McCafferty (1981) described *Stenonema bednariki* from larvae collected in Kentucky and Missouri. The adults have remained undescribed. Recently, the senior author successfully reared males and females from the Middle Fork of the Black River, Reynolds County, Missouri. Terminology follows Bednarik and McCafferty (1979).

MALE IMAGO: Length 7-7.5 mm. Head pale. Compound eyes separated dorsally by distance greater than width of lateral ocelli. *Thorax*. Pale brown; mesoscutellum tinged with white as Fig. 2. Fore tibiae yellow to white with apices dark; fore tarsal ratio 1.6-2.1. Forewings hyaline with costa, subcosta, and radius yellow; other longitudinal veins brown; crossveins brown; faint reddish or reddish brown tinge in stigmatic area; 1 or 2 crossveins in each of first 3 bulla interspaces, not crowded; 7-11 crossveins in first interspace distal to bulla region. Hindwings dusky on apical portions of outer margins. *Abdomen*. Segments 1-7 hyaline-white; 8-10 opaque, creamy shaded with brown. Terga 2-7 with wide, dark transverse lines at posterior margins (Fig. 1); spiracular markings present. Caudal filaments white; segments joints darkened. Penes rounded (Fig. 3).

FEMALE IMAGO: Posterior margin of subanal plate as in Fig. 4. Diagnosis: *Stenonema bednariki* is a member of the subgenus *Maccaffertium* Bednarik, 1979, and will key to couplet 21 in Bednarik and McCafferty (1979). However, the couplet can be modified to accommodate *S. bednariki* as follows:

21. Penes shaped as in Fig. 44 (boot-shaped) (Bednarik and McCafferty), 1979). Range limited to extreme southern United States *S. smithae*
 Penes shaped as in Fig. 48 (rounded) (Bednarik and McCafferty, 1979) or Fig. 3. Widespread distribution 21a
 21a. Terga 2-7 with narrow dark transverse lines at posterior margin (Fig. 97, Bednarik and McCafferty, 1979). Thorax pale creamy white to yellowish brown. Widespread distribution (see p. 19, Bednarik and McCafferty, 1979) *S. exiguum*
 Terga 2-7 with wide, dark transverse lines at posterior margin (Fig. 1). Thorax brown with markings as Fig. 2. Distribution, Kentucky, Missouri and Oklahoma *S. bednariki*

Remarks.—McCafferty (1981) speculated that *S. bednariki* was most closely related to *S. pulchellum* (Walsh), based on larval characters. Adults characters support the inclusion of *S. bednariki* as a member of Cluster IIIA as defined by Bednarik and McCafferty (1979). Male adults of *S. bednariki*, however, can be readily distinguished from *S. pulchellum* by the darkened hindwing margins.

**Stenonema exiguum* Traver - Hickory Co: Little Niangua R., NW¼ S25 T38N R20W, IX-14-1995, R. J. Sarver & S. Humphrey, larvae (MU); Mississippi Co: Maple Slough Ditch, Township line 24N and 25N R15E, IX-8-1993, R. J. Sarver, larvae (MU).

- Stenonema femoratum* (Say) - Cape Girardeau Co: Apple Cr., NW¼ S4 T33N R11E, III-23-1993, R. J. Sarver, larvae (MU); Madison Co: Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-23-1989, B. C. Kondratieff, adults & larvae (CSU); Marble Cr., S½ S18 T32N R5E, III-18-1993, R. J. Sarver, larvae (MU); Maries Co: Gasconade R., near Hwy. 63 bridge, V-3-1989, S. Humphrey, larvae (MU); Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, adults & larvae (CSU); Reynolds Co: Middle Fork Black R., S½ S17 T32N R2E, IX-20-1996, R. J. Sarver, adults (MU). Other records are available in Traver (1935) and Bednarik and McCafferty (1979).
- Stenonema mediopunctatum arwini* (McDunnough) - Crawford Co: Meremac R., SW¼ S35 T36N R5W, III-24-1993, R. J. Sarver, larvae (MU); Douglas Co: Spring Cr., SW¼ S23 T25N R11W, IX-20-1993, R. J. Sarver (MU); Madison Co: Marble Cr., S½ S18 T32N R5E, III-18-1993, R. J. Sarver, larvae (MU). Other records available in Bednarik and McCafferty (1979).
- **Stenonema mexicanum integrum* (McDunnough) - Cole Co: Missouri R., Jefferson City, V-21-1996, R. J. Sarver, larvae (MU); Livingston Co: Grand R., Hwy. 36 bridge, VII-12-1996, R. J. Sarver (MU).
- **Stenonema modestum* (Banks) - Phelps Co: Little Piney Cr., S32 T36N R8W, III-22-1996, R. J. Sarver & S. Humphrey, larvae (MU); Phelps Co: Mill Cr., SW¼ S4 T36N R9W, III-29-1996, R. J. Sarver & S. Humphrey, larvae (MU).
- Stenonema pulchellum* (Walsh) - Franklin Co: Meramec R., Meramec St. Pk., V-29-1990, B. C. Kondratieff, adults (CSU); Greene Co: Clear Cr., S4 T30N R24W, IV-3-1996, S. Humphrey, larvae (MU); Maries Co: Gasconade R., near Hwy. 63 bridge, VI-5-1989, B. C. Poulton, larvae (MU). Other records are available in Bednarik and McCafferty (1979).
- Stenonema terminatum terminatum* (Walsh) - Maries Co: Gasconade R., near Hwy. 63 bridge, VI-5-1989, B. C. Poulton, larvae (MU); Nodaway Co: Honey Cr., S24 T65N R34W, IV-13-1993, R. J. Sarver, larvae (MU); Worth Co: East Fork Grand R., N½ S32 T66N R30W, IV-22-1993, R. J. Sarver, larvae (MU). Other records available in Bednarik and McCafferty (1979).
- **Stenonema vicarium* (Walker) - McDonald Co: Big Sugar Cr., N½ S21 T22N R30W, III-8-1993, R. J. Sarver, larvae (MU).

Isonychiidae

- Isonychia bicolor* (Walker) - Maries Co: Gasconade R., near Rt. 42 bridge, V-2-1989, S. Humphrey, larvae (MU); Phelps Co: Gasconade R., Jerome Access, VII-20-1990, B. C. Poulton, adults (MU); Shannon Co: Jack's Fork R., S32 T28N R6W, IX-14-1993, R. J. Sarver, larvae (MU). Other records available in Kondratieff and Voshell (1984).
- **Isonychia rufa* McDunnough - Holt Co: Nodaway R., W½ S2 T60N R37W, VII-6-1996, R. J. Sarver, larvae (MU); Nodaway Co: Honey Cr., S24 T65N R34W, VIII-31-1993, R. J. Sarver, larvae (MU); Nodaway Co: Long Branch Platte R., E½ S19 T62N R34W, IX-1-1993, R. J. Sarver, larvae (MU); Worth Co: East Fork Grand R., N½ S32 T66N R30W, VIII-31-1993, R. J. Sarver, larvae (MU).
- #*Isonychia sayi* Burks - All records are from Kondratieff and Voshell (1984).
- **Isonychia sicca* Burks - Buchanan Co: Platte R., Hwy. 36 bridge, VII-12-1996, R. J. Sarver, larvae (MU); Cole Co: Missouri R., Jefferson City, VII-29-1995, R. J. Sarver, larvae (MU); Livingston Co: Grand R., Hwy. 36 bridge, VII-12-1996, R. J. Sarver, reared (MU).

Leptohyphidae

- **Tricorythodes cobbi* Alba-Tercedor and Flannagan - Douglas Co: North Fork White R., IX-9-1988, R. J. Sarver, adults (MU); Phelps Co: Little Piney Cr., S32 T36N R8W, IX-11-1996, R. J. Sarver, adults (MU).

Leptophlebiidae

- **Choroterpes basalis* (Banks) - Callaway Co: Turkey Cr., SE¼ SW¼ S27 T45N R11W, VI-10-1996, R. J. Sarver, reared (MU); Franklin Co: Boeuf Cr., W½ S30 T44N R3W, IX-7-1993, R. J. Sarver, adults (MU).
- **Habrophlebiodes americana* Traver - Callaway Co: Turkey Cr., SE¼ SW¼ S27 T45N R11W, VI-21-1996, R. J. Sarver, adults & larvae (MU); Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-26-1989, B. C. Kondratieff and M. Harris, adults & larvae (CSU); Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, larvae, adults (CSU).
- **Leptophlebia cupida* (Say) - Newton Co: Carver Br., George Washington Carver National Monument, VI-27-1989, B. C. Kondratieff, larvae, adults (CSU).
- **Leptophlebia nebulosa* (Walker) - Sullivan Co: Spring Cr., S25 T64N R16W, IV-7-1995, R. J. Sarver, reared (MU).

**Neochoroterpes oklahoma* (Traver) - Ozark Co: North Fork White R., Hwy. PP bridge, IX-9-1988, R. J. Sarver, adults (MU).

**Paraleptophlebia ontario* (McDunnough) - Callaway Co: Turkey Cr., SE¼ SW¼ S27 T45N R11W, VI-5-1996, R. J. Sarver, reared (MU); Franklin Co: Meremac R., Meremac State Park, VI-1-1990, B. C. Kondratieff, adults (CSU).

**Paraleptophlebia praepedita* (Eaton) - Callaway Co: Hillers Branch, Hwy. 54 bridge ca 2 mi. NE New Bloomfield, V-11-1995, R. J. Sarver, adults, reared (MU).

Neophemeridae

**Neophemera bicolor* McDunnough - Maries Co: Gasconade R., Paydown Access, III-27-1990, B. C. Poulton, larvae (MU).

Polymitarciidae

Ephoron album (Say) - Christian Co: James R., VII-26-1978, B. H. Tracy, larvae (MU); Greene Co: James R., Springfield, VII-7-1995, S. Humphrey, larvae (MU); Maries Co: Gasconade R., 1 km. below Rt. 42 bridge, VII-27-1989, B. C. Poulton, larvae (MU); Osage Co: Gasconade R., 2 km. below Rt. 50 bridge, VIII-7-1990, B. C. Poulton, adults (MU). Other records are available in McCafferty (1994).

Ephoron leukon Williamson - Christian Co: Finley Cr., VII-26-1978, B. H. Tracy, larvae (MU). Other records are available in McCafferty (1994).

Tortopus primus (McDunnough) - Cole Co: Missouri R., S22 T44N R11W at Jefferson City, VII-31-1995, R. J. Sarver, adults and larvae (CSU, MU & PERC). Other records are available in McCafferty (1994).

Potamanthidae

Anthopotamus myops (Walsh) - Cole Co: Missouri R., Jefferson City, VII-27-1995, R. J. Sarver, adult (MU); Maries Co: Gasconade R., Missouri Dept. Cons. Paydown Access, IV-2-1989, S. Humphrey, larvae (MU); Phelps Co: Gasconade R., Jerome Access, VII-20-1990, B. C. Poulton, adults (MU). Other records are available in Bae and McCafferty (1991) and McCafferty (1994).

**Anthopotamus neglectus neglectus* (Traver) - Greene Co: Wilson's Cr., Wilson's Creek National Battlefield, VI-26-1989, B. C. Kondratieff and M. Harris, larvae (CSU).

#*Anthopotamus verticus* (Say) - All records are from Bae and McCafferty (1991) and McCafferty (1994).

Pseudironidae

#*Pseudiron centralis* McDunnough - All records are from Traver (1935).

Siphonuridae

Siphonurus minnoi Provonsha and McCafferty - Douglas Co: North Fork White R., low water bridge between Hwy's. 76 and E, V-12-1989, R. J. Sarver, adults (CSU & MU). Other records are available in Provonsha and McCafferty (1982).

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**First Records of *Megachile (Callomegachile) sculpturalis* Smith
(Hymenoptera: Megachilidae) in the Continental United States**

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ABSTRACT: *Megachile (Callomegachile) sculpturalis* Smith is recorded from the continental United States for the first time. Presently it is only known in North Carolina where it was presumably introduced from its native range in Japan and China.

Accidental introduction of Old World bees into the United States is a rare event and usually goes unnoticed for several years while populations build to noticeable levels. *Megachile (Callomegachile) sculp-*

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