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## RESEARCH ARTICLE

# LITTLE KNOWN CONTRIBUTION TO VIRGINIA EPHEMEROPTERA BY RICHARD L. HOFFMAN

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### ABSTRACT

Richard L. Hoffman, one of the preeminent natural historians of Virginia, sampled mayflies (Ephemeroptera) while serving as Curator of Recent Invertebrates at the Virginia Museum of Natural History. Over a course of more than 20 years (1988–2009) he collected a total of 10 families, 24 genera, and 56 species representing six new state records and 134 new county records.

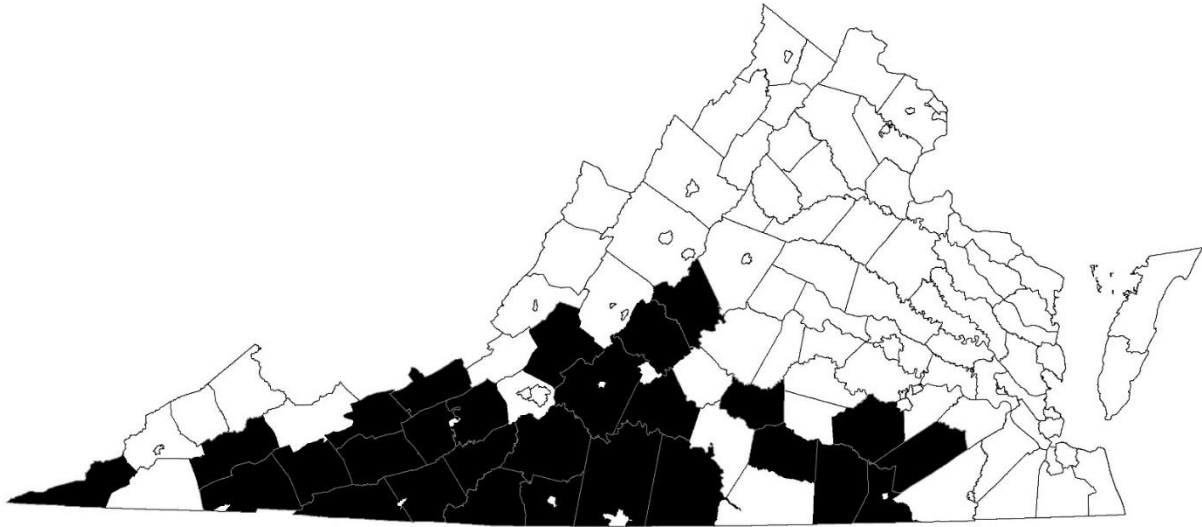
**Keywords:** Commonwealth, mayflies, records, species.

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### INTRODUCTION

Richard L. Hoffman was the last of the great Virginia natural historians. His scholarship includes nearly 500 publications, and his expertise included entomology (especially beetles and true bugs), herpetology (especially salamanders), arachnology (especially spiders), and myriapodology (especially millipedes) (see Mitchell, 2009; Roble, 2009; Roble & Mitchell, 2009, 2012 for a detailed and in-depth account of Richard Hoffman’s life and contributions). In all of the breadth of his work, he surprisingly never published an article specific to mayflies (Ephemeroptera), although one species, *Isonychia hoffmani* Kondratieff & Voshell (1984), is named in his honor. While identifying material borrowed from the Virginia Museum of Natural History, it was discovered that nearly all mayfly specimens were collected by R. L. Hoffman, with 134 of 206 samples representing new county records, and sampling sites included 28 counties,

mostly in southern and western Virginia (Fig. 1). This publication honors the little-known contribution that he made to our knowledge of Virginia mayfly diversity and distribution.



**Figure 1.** Map of Virginia counties in which Richard L. Hoffman collected adult mayflies (courtesy of S. M. Roble).

## MATERIALS AND METHODS

In the inventory presented below, taxa are arranged alphabetically by family, genus, and species. Data are based on adult specimens, as indicated by AM (adult male), SM (subimago male), or AF (adult female) preceding the date sampled. All specimens are deposited in the Virginia Museum of Natural History, Martinsville, Virginia. All material was collected solely by R. L. Hoffman, unless otherwise indicated, and all locality records are taken verbatim from the specimen labels.

## LIST OF SPECIES

### Family Baetidae

*Acentrella turbida* (McDunnough) – Franklin Co.: Pigg R, 0.3 mi upstream Rt 890 bridge, SW Penhook, AM, 6.26.05; – Grayson Co.: New R @ VA 93 bridge, 1 mi E Mouth of Wilson on US 58, AM, 8.1.01, RL Hoffman; – Patrick Co.: South Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06.

*Baetis flavistriga* McDunnough – Franklin Co.: Pigg R, 0.3 mi upstream Rt 890 bridge, SW Penhook, AM, 6.26.05; – Patrick Co.: South Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06; – Smyth Co.: Hungry Mother State Park, steam below dam spillway, AM, 7.19.06.

*Baetis intercalaris* McDunnough – Franklin Co.: Pigg R, 0.3 mi upstream Rt 890 bridge, SW Penhook, AM, 6.26.05; – Patrick Co.: Mill Cr @ Rt 628, ca 3 mi E Critz, AM, 6.10.07.

*Baetis phoebus* McDunnough – Grayson Co.: Little R @ VA Rt 625 3 mi S Baywood, AM, 6.3.00.

*Baetis tricaudatus* Dodds – Patrick Co.: South Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 7.19.06; – Smyth Co.: Hungry Mother State Park, stream below dam spillway, AM, 7.19.06.

*Iswaeon rubrolaterale* (McDunnough) – Patrick Co.: S Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06.

*Plauditus punctiventris* (McDunnough) – Grayson Co.: Little R @ VA Rt 625, 3 mi S Baywood, AM, 6.3.00.

### **Family Caenidae**

*Caenis amica* Hagen – Giles Co.: Walker Cr, 2.5 mi SW White Gate on VA Hwy 670, AM/AF, 5.24.91; – Halifax Co.: Dan R floodplain, 5 mi NW Turbeville, AM, 7.13.97; – Patrick Co.: Dan R @ end of VA 813, 2 mi NW Claudville, AM, 9.3.00.

*Caenis anceps* Traver – Russell Co.: Clinch R @ Nash Ford, 0.2 mi above VA 645, 4 mi E Lebanon, AM/AF, 9.11.88.

*Caenis diminuta* Walker – Greenville Co.: Drift Fence Site @ end VA 666, 1 mi NE Clarkesville, AM/AF, 8.7.96, RL Hoffman and SM Roble.

*Caenis latipennis* Banks – Giles Co.: Big Walker Cr, VA 670, 2.5 mi SW White Gate, AM, 5.24.91.

### **Family Ephemerellidae**

*Ephemerella dorothea* Needham – Bland Co.: Big Walker Cr, Rt 640, 2 mi E of Bland Courthouse, AM, 5.24.88; – Floyd Co.: Indian Ridge, steamlet on Rt 771 at jct Rt 768, 2 mi E of Willis, AM, 5.22.04; – Franklin Co.: Grassy Fork Cr, 2 mi SE Snow Cr on Rt 619, AM, 4.30.07; – Patrick Co.: Rye Cove Cr, Rt 815, 3 mi N jct Rt 631 W of Stuart, AM, 5.21.07.

*Ephemerella invaria* (Walker) – Franklin Co.: Shooting Cr, VA 860, 1 mi W jct VA 40, AM, 4.10.94.

*Serratella serratoides* (McDunnough) – Patrick Co.: S Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06.

### **Family Ephemeridae**

*Ephemerella blanda* Traver – Carroll Co.: E Fk Crooked Cr, VA 835 bridge, SW Fancy Gap, AF, 6.18.00; – Floyd Co.: Rt 758, S edge Buffalo Mtn Natural Area Preserve, 100' E crest of Long Mtn, AF, 6.14.03; – Lee Co.: Hardy Cr @ VA 621 underpass, L&N RR nr Hagan, SM, 7.13.95; – Patrick Co.: Dan R @ end VA 813, 2 mi NW Claudville, SM, 7.9.00.

*Ephemera guttulata* Pictet – Floyd Co.: Berry’s Cr, Hwy 613, ca 3 mi WNW Indian Valley, AF, 5.22.04; – Patrick Co.: Hales Cr, Fairystone State Park, 0.2 km above bridge, SM, 5.5.01.

*Ephemera varia* Eaton – Montgomery Co.: Meadow Cr, 4.3 mi S Radford, Rt 787, SM, 8.3.88; – Washington Co.: Laurel Cr beside US Hwy 58, 3 mi E Damascus, AF, 8.12.89.

*Hexagenia atrocaudata* McDunnough – Floyd Co.: Little R @ VA 810, ca 5 mi NW of Floyd, AM, 8.27.88; – Russell Co.: Clinch R @ VA 661 bridge, AM, 8.5.88.

*Hexagenia bilineata* (Say) – Halifax Co.: Elkhorn Cr swamp, 2.5 mi E Riceville, AF, 8.8.98; – Patrick Co.: Rye Cove Cr, Rt 615, 2.5 mi jct 631, ca 4 mi W Stuart, AF, 5.31.09; – Pittsylvania Co.: Whitehorn Cr @ Rt 683 bridge, 7 mi SE Gretna, AF, 9.7.01; – Prince Edward Co.: Twin Lakes State Park, AF, 7.9.97.

*Hexagenia limbata* (Serville) – Bland Co.: Kimberling Cr, 0.5 mi upstream VA 42 bridge, AF, 8.22.91; – Campbell Co.: Seneca Cr, VA Hwy 704 bridge, ca 2 mi W Long Island, AF, 7.19.88; – Carroll Co.: E Fk Crooked Cr, VA 835 bridge, SW Fancy Gap, AF, 6.18.00; – Dinwiddie Co.: Trib to Namozine Cr, 3 mi N Ford on Hwy 622, AF, 6.7.92; – Floyd Co.: Shooting Cr, VA 860, AM, 6.28.96, RL Hoffman and SJ Pike; – Franklin Co.: Pigg R, 0.3 mi upstream Rt 890 bridge, SW Penhook, AM, 6.26.05; – Greensville Co.: Fontaine Swamp, along VA Rt 624 nr VA 730, AF; – Halifax Co.: Sandy Cr @ Rt 672 bridge, 1 mi SE Rodden, AF/SM, 5.30.98; – Henry Co.: SF Mayo R @ VA 695 bridge, 4 mi S Spencer, AM, 6.18.89; – Lee Co.: Hardy Cr @ VA 621 underpass, L&N RR nr Hagan, AF, 7.13.95; – Lunenburg Co.: N Fk Meherrin R @ VA Hwy 49 bridge, AF, 8.10.88; – Montgomery Co.: Meadow Cr, 4.3 mi S Radford, Rt 787, AF, 8.3.88; – Patrick Co.: Shooting Cr, beside Rt 622, 4 mi NE Charity, AM/AF, 6.21.07; – Pittsylvania Co.: Whitehorn Cr @ VA 685, ca 1 mi E Sonans, AM/AF, 8.15.98; – Russell Co.: Little R @ Midway Ford, Slow Ranch, NE Blackford, AM, 8.5.88; – Smyth Co.: N Fk Holston R, VA Hwy 620, 0.5 mi E VA 42, 2 mi E Chatham, SM, 9.3.89; – Washington Co.: N Fk Holston R @ Mougall Spring, VA Hwy 61, AM, 9.3.89; – Wythe Co.: Reed Cr, Hwy 658, 1 mi W Wytheville, AF, 7.6.92.

### Family Heptageniidae

*Cinygmula subaequalis* (Banks) – Nelson Co.: Tye R @ Crabtree Falls, AM, 8.2.97.

*Epeous vitreus* (Walker) – Grayson Co.: Helton Cr, Rt 783, 0.5 mi from jct US 58, AM, 8.7.02.

*Heptagenia marginalis* Banks – Henry Co.: Mayo R @ Moore’s Mill, VA Hwy 629, 3 mi SE Spencer, AM, 6.11.91.

*Heptagenia townesi* Traver – Patrick Co.: Dan R @ Kibler Valley, 5 mi NNW of Claudville, AM, 4.28.02. **NEW STATE RECORD.**

*Leucrocuta aphrodite* (McDunnough) – Floyd Co.: Big Indian Cr @ upper bridge, VA 631, ca 3 mi ENE Indian Valley, AM, 5.27.90; – Grayson Co.: Little R @ VA Rt 625, 3 mi S Baywood, AM, 6.3.00; – Nelson Co.: Tye R @ Tyro, beside VA Rt 56, AM, 9.5.98; – Patrick Co.: Smith R, VA 618 bridge, S Woolwine, AM, 6.17.96.

*Leucrocuta hebe* (McDunnough) – Franklin Co.: Roaring Run Bridge, 2.8 mi W of Endicott, Rt 793, AM/AF, 8.18.06; – Greensville Co.: Nottoway R @ Rt 631 boat landing, ca 6 mi NW Jarratt, AM, 5.6.05; – Patrick Co.: S Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06; – Washington Co.: Valley Cr, Taylors Valley, AM/AF, 6.6.96.

*Leucrocuta maculipennis* (Walsh) – Amherst Co.: Piney R, ca 1 km W Alhambra on FS 63, AM, 6.7.96.

*Leucrocuta umbratica* (McDunnough) – Floyd Co.: Indian Ridge, streamlet at jct Rts 771 and 768, 2 mi E of Willis, AM, 5.22.04. **NEW STATE RECORD.**

*Maccaffertium exiguum* (Traver) – Greensville Co.: Nottoway R @ Rt 630 boat landing, ca 6 mi NW Jarratt, AM, 5.6.05.

*Maccaffertium meririvulanum* (Carle and Lewis) – Amherst Co.: Piney R, ca 1 km W Alhambra of FS 63, AM, 6.7.96, RL Hoffman and J Anderson; – Henry Co.: Matrimony Cr trib @ VA 637, 3 mi SE Ridgeway, AM, 5.21.90.

*Maccaffertium mexicanum* (Ulmer) – Henry Co.: S Fk Mayo R @ VA 695 bridge, 4 mi S Spencer, AM/AF, 6.18.89; – Pittsylvania Co.: Berry Hill Site, Rt 880, ca 0.5 km S jct Rt 863, AM/AF, 7.24.05.

*Maccaffertium modestum* (Banks) – Floyd Co.: Twin Falls nr Copper Hill, AM, 8.4.88; – Halifax Co.: Elkhorn Cr swamp, 2.5 mi E Riceville, AM, 7.22.00.

*Maccaffertium pudicum* (Hagen) – Floyd Co.: Shooting Cr, VA 860, 0.5 mi W county line, AM, 5.5.90.

*Maccaffertium terminatum* (Walsh) – Bedford Co.: Goose Cr, ca 3 mi WNW Huddleston, AM, 7.11.98; – Halifax Co.: swamp nr Elkhorn Cr, beside VA 702, ca 3 mi E Riceville, AM, 6.22.98; – Pittsylvania Co.: Roanoke R below Smith Mountain Dam, AEPCO Picnic Area, AM, 6.6.99.

*Maccaffertium vicarium* (Walker) – Bland Co.: Big Walker R, Rt 604, 2 mi E of Bland Courthouse, AM, 5.24.88; – Floyd Co.: Big Laurel Cr headwaters @ VA 631 bridge, 3 mi NNW Indian Valley, AM/AF, 5.27.90.

*Macdunnoa persimplex* (McDunnough) – Patrick Co.: S Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06. **NEW STATE RECORD.**

*Nixe spinosa* (Traver) – Washington Co.: Valley Cr, Taylors Valley, AM, 7.6.96. **NEW STATE RECORD.**

*Rhithrogena amica* Traver – Patrick Co.: Rye Cove Cr, Rt 815, 3 mi N jct Rt 631 W of Stuart, AM, 5.21.07.

*Stenacron carolina* (Banks) – Pittsylvania Co.: stream on Rt 880, 0.2 mi S jct Rt 683, AM/AF, 5.16.04.

*Stenacron gildersleevei* (Traver) – Franklin Co.: Grassy Fork Cr, 2 mi S Snow Cr on Rt 619, AM, 7.1.06.

*Stenacron interpunctatum* (Say) – Carroll Co.: E Fk Crooked Cr, VA 835 bridge, SW Fancy Gap, AM, 6.18.00; – Floyd Co.: VA Rt 8 @ jct 807, ca 3 mi S Floyd, AM/AF, 6.18.02; – Franklin Co.: Grassy Fork Cr, 2 mi S Snow Cr on Rt 619, AM, 5.26.02; – Greensville Co.: Fontaine Swamp, VA 625 bridge, 10 mi SE Emporia, AM/AF, 5.25.89; – Patrick Co.: Russell Cr, jct Rts 631 and 652, 3 mi SE of Stuart, AM/AF, 9.10.05; – Pittsylvania Co.: Whitehorn Cr @ Rt 683, 5 mi SW Mt Airy, AM, 6.10.06; – Sussex Co.: Honey Pond, 6 km SE Sussex Courthouse, VA Rt 632, AM, 7.15.97.

*Stenacron pallidum* (Traver) – Botetourt Co.: Craig Cr @ VA 706 ford Oriskany, AM, 8.8.98.  
**NEW STATE RECORD.**

*Stenonema femoratum* (Say) – Bedford Co.: Goose Cr, ca 3 mi WNW Huddleston, AM/AF, 7.11.98; – Bland Co.: Big Walker Cr, Rt 604, 2 mi E of Bland Courthouse, AM, 5.24.88; – Brunswick Co.: Reedy Cr @ VA 606 bridge, 1 mi SW Freeman, AM, 4.21.94; – Floyd Co.: Big Indian Cr @ upper bridge, VA 631, ca 3 mi ENE Indian Valley, AM, 5.27.90; – Franklin Co.: Grassy Fork Cr, 2 mi SE Snow Cr on Rt 619, AM, 4.30.07; – Grayson Co.: Little R @ VA Rt 625, 3 mi S Baywood, AM, 6.3.00; – Halifax Co.: Sandy Cr @ VA 672, ca 7 mi NW Boston, AM/AF, 7.23.98; – Nelson Co.: upper Paul's Cr, 2.5 mi NNW Nellysford, AM, 5.20.98; – Patrick Co.: Rockcastle Cr, Rt 8, AM, 6.17.90; – Pittsylvania Co.: Whitehorn Cr @ Rt 683, 5 mi SW Mt Airy, AM, 6.10.06.

### Family Isonychiidae

*Isonychia arida* (Say) – Bedford Co.: Goose Cr, ca 3 mi WNW Huddleston, AM, 7.11.98; – Franklin Co.: Grassy Fork Cr, 2 mi S Snow Cr on Rt 619, AF, 8.16.01; – Halifax Co.: Sandy Cr @ Rt 672 bridge, 1 mi SE Rodden, AM/AF, 5.30.98; – Pittsylvania Co.: Dan R floodplain, Rt 880, 0.5 mi S jct 863, AM/AF, 7.1.04.

*Isonychia bicolor* (Walker) – Campbell Co.: Seneca Cr, VA Hwy 704 bridge, AM/AF, 7.19.88; – Floyd Co.: Greasy Cr @ VA Hwy 622 bridge, ca 3 mi SW Indian Valley, AM, 7.18.88; – Halifax Co.: Dan R floodplain, 5 mi NW Turbeville, AM/AF, 7.13.97; – Patrick Co.: Peters Cr, 3 mi S Five Forks on Rt 660, AM, 8.7.05; – Wythe Co.: Reed Cr, VA Hwy 658, ca 1 mi W Wytheville, AF, 7.6.91.

*Isonychia georgiae* McDunnough – Floyd Co.: Buffalo Mountain Natural Area Preserve, Rt 758, AF, 7.19.03; – Henry Co.: S Fk Mayo R @ VA 695 bridge, 4 mi S Spencer, AF, 6.18.89; – Pittsylvania Co.: Dan R floodplain, stream on Rt 880, 0.5 mi S jct Rt 683, AM/AF, 6.24.03.

*Isonychia obscura* Traver – Patrick Co.: S Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AM, 6.15.06; – Pittsylvania Co.: Whitehorn Cr @ Rt 683, 5 mi SW Mt Airy, AF, 6.10.06.

*Isonychia sayi* Burks – Sussex Co.: Chub Sandhills Natural Area Preserve, 6 mi SE Sussex, AM, 5.21.96, RL Hoffman and SM Roble. **NEW STATE RECORD.**

*Isonychia similis* Traver – Franklin Co.: Pigg R, 0.3 mi upstream Rt 890 bridge, SW Penhook, AF, 6.26.05; – Patrick Co.: Rye Cove Cr, Rt 815, ca 4 mi NW Stuart, AM/AF, 7.5.08.

*Isonychia tusculanensis* Berner – Bedford Co.: Difficult Cr, jct Rts 735 and 817, ca 3 mi W Huddleston, AF, 9.13.04.

### **Family Leptophlebiidae**

*Neoleptophlebia adoptiva* (McDunnough) – Washington Co.: Valley Cr, Taylors Valley, AM, 7.6.96.

### **Family Metretopodidae**

*Siphloplecton basale* (Walker) – Floyd Co.: Little R @ VA 810, ca 5 mi NW of Floyd, AF, 4.30.89.

### **Family Polymitarciidae**

*Ephoron leukon* Williamson – Floyd Co.: Little R @ VA 810 bridge, ca 3 mi NW Floyd, AM, 8.27.88; – Pulaski Co.: Big Reed Island Cr, 1 mi upstream VA Hwy 693 bridge, AM, 9.3.88.

### **Family Potamanthidae**

*Anthopotamus distinctus* (Traver) – Franklin Co.: Shooting Cr, Rt 860, 1.4 mi W jct VA 40, AM/AF, 7.13.91; – Patrick Co.: South Mayo R, 2.3 mi SE of Stuart at jct Rts 860 and 727, AF, 6.15.06.

*Anthopotamus neglectus* (Traver) – Franklin Co.: 2.8 mi W of Endicott, Rt 793, Roaring Run Bridge, AM/AF, 8.18.06; – Grayson Co.: New R @ VA 93 bridge, 1 mi E mouth of Wilson on US 58, AM, 8.20.01.

*Anthopotamus verticis* (Say) – Pulaski Co.: Little Reed Island Cr @ Boone Furnace, VA Hwy 608, AM/AF, 6.10.90.

## **DISCUSSION**

McCafferty et al. (2010) reported 170 species of mayflies occurring in the Commonwealth of Virginia. Of the 56 species collected by R. L. Hoffman, five Heptageniidae (*Heptagenia townesi* Traver, *Leucrocuta umbratica* (McDunnough), *Macdunnoa persimplex* (McDunnough), *Nixe spinosa* (Traver), *Stenacron pallidum* (Traver)), and one Isonychiidae (*Isonychia sayi* Burks) represent new state records, and the overall collection contributes toward 134 new county records. Four of the new state records also represent range extensions as follows: *Heptagenia townesi* (north), *Leucrocuta umbratica* (southeast), *Macdunnoa persimplex* (east), *Nixe spinosa* (north).



Records of *Stenacron pallidum* and *Isonychia sayi* fill important gaps in the overall ranges of these species (see e.g., Randolph & McCafferty, 1998; Jacobus & McCafferty, 2001; McCafferty et al., 2010). The remaining 128 new county records fill in associated range gaps within the Commonwealth of Virginia.

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