



NEW STATE RECORDS OF KENTUCKY (USA) STONEFLIES (PLECOPTERA)

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ABSTRACT

The checklist of the stoneflies of Kentucky is updated to 125 species. Fourteen new or confirmed state records and associated range extensions are reported for *Leuctra carolinensis* Claassen, *L. truncata* Claassen, *L. variabilis* Hanson, *Alloperla aracoma* Harper & Kirchner, *Sweltsa lateralis* (Banks), *Agnentina annulipes* (Hagen), *Neoperla coosa* Smith & Stark, *Paragnetina kansensis* (Banks), *Perlesta ouabache* Grubbs & DeWalt, *P. placida* (Hagen), *Hydroperla fugitans* (Needham & Claassen), *Isoperla bilineata* (Say), *I. kirchneri* Szczytko & Kondratieff, and *I. namata* Frison.

Keywords: Plecoptera, stoneflies, Kentucky, U.S.A, state records, range extensions

INTRODUCTION

Tarter et al. (2006) provided the most recent checklist to the stoneflies of Kentucky, reporting 110 species in 34 genera. Fifteen new state records were included. The intent of this paper is to update the Kentucky faunal list of Plecoptera, including the addition of 14 species either previously unknown from the state or whose identity has been confirmed with recent taxonomic changes and revisions.

MATERIALS AND METHODS

New and confirmed state records were based mainly on independent collecting efforts by the authors since Tarter et al. (2006) and material housed at the Illinois Natural History Survey, Champaign, Illinois (INHS). Some locality data were recorded directly with portable GPS units or georeferenced using ACME Mapper 2.1. Other codens used herein are R.W. Baumann collection, Monte L. Bean Museum, Brigham Young

University, Provo, Utah (BYUC), Donald C. Tarter collection, Marshall University, Huntington, West Virginia (DCTC), Ohio Biological Survey Collection, Columbus, Ohio (OBSC), Purdue Entomological Research Collection, West Lafayette, Indiana (PERC), and Western Kentucky University, Bowling Green (WKUC).

RESULTS AND DISCUSSION

Emendations and taxonomic changes have resulted in the removal or substitution of six species from the state checklist. Prior records of *Sweltsa onkos* (Ricker) likely all pertain to *S. hoffmani* Kondratieff & Kirchner and are discussed in greater detail below. *Perlesta napacola* DeWalt was placed as a junior synonym of *P. teaysia* Kirchner & Kondratieff by Grubbs & DeWalt (2008). Previous Kentucky records of *Perlesta shubuta* Stark now refer to the broadly distributed eastern Nearctic species *P. ephelida* Grubbs & DeWalt (Grubbs & DeWalt 2012). Szczytko & Kondratieff (2015), in their revision of eastern Nearctic *Isoperla*, were subsequently unable to confirm the presence of *I. bilineata* (Say), *I. namata* Frison, *I. richardsoni* Frison, and *I. similis* (Hagen) in Kentucky.

Five additional new species descriptions have

occurred since Tarter et al. (2006). *Soyedina calcarea* Grubbs and *Leuctra schusteri* Grubbs were described from the Mammoth Cave region (Grubbs 2006, Grubbs 2015). These two additions increased the number of species with Kentucky type localities from seven to nine (Tarter et al. 2006). *Alloperla petasata* Surdick was described from Virginia (Surdick 2004) and noted from Kentucky by Baumann & Kondratieff (2009). *Perlesta shawnee* Grubbs was described from Illinois and Indiana (Grubbs 2005) and first reported from the state in Grubbs (2012). Szczytko & Kondratieff (2015) provided the first Kentucky record of *Isoperla montana* (Banks) and included *I. nelsoni* Szczytko & Kondratieff in the distribution list for the state.

Fourteen new or confirmed state records are presented below, plus additional records of three species whose distribution in Kentucky is also still meagerly understood. Overall, 125 species are now known from Kentucky. All nine Nearctic families are represented (Table 1). The Perlidae is easily the most species-rich family in the state (37), followed by Perlodidae (21), and Capniidae (16) (Fig. 1). Six genera in particular comprise just over half (66/125 = 53%) of the recorded species: *Allocapnia* (15), *Isoperla* (13), *Acroneuria* (10), *Leuctra* (10), *Perlesta* (10), and *Alloperla* (8).

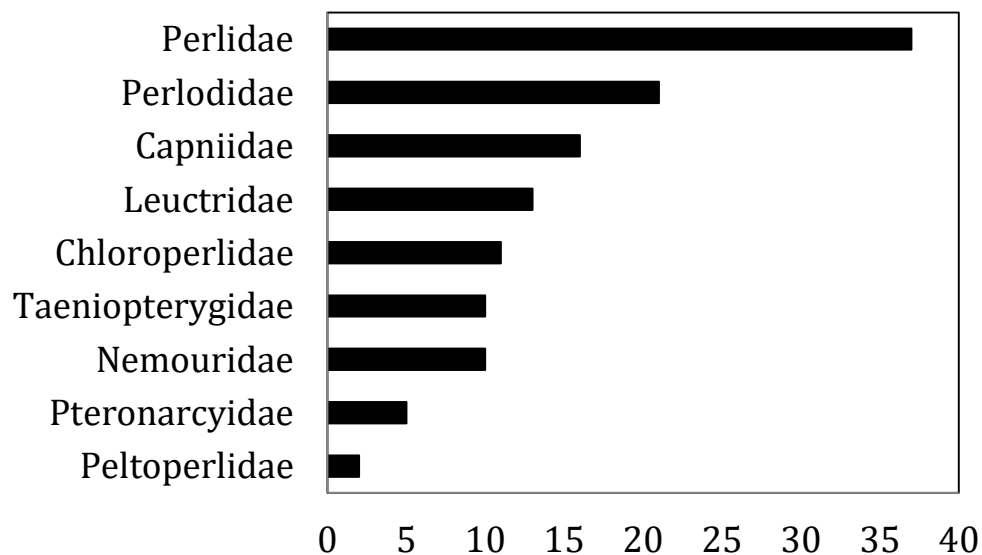


Fig. 1. Distribution of species among families of stoneflies known to occur in Kentucky.

Table 1. List of Kentucky stoneflies. New or confirmed records are marked by an asterisk *

Family Capniidae

Allocaupnia cunninghami Ross & Ricker
Allocaupnia curiosa Frison
Allocaupnia forbesi Frison
Allocaupnia frisoni Ross & Ricker
Allocaupnia granulata (Claassen)
Allocaupnia indianae Ricker
Allocaupnia mystica Frison
Allocaupnia nivicola (Fitch)
Allocaupnia ohioensis Ross & Ricker
Allocaupnia pygmaea (Burmeister)
Allocaupnia recta (Claassen)
Allocaupnia rickeri Frison
Allocaupnia smithi Ross & Ricker
Allocaupnia vivipara (Claassen)
Allocaupnia zola Ricker
Paracupnia angulata Hanson

Family Leuctridae

Leuctra alexanderi Hanson
Leuctra alta James
**Leuctra carolinensis* Claassen
Leuctra ferruginea (Walker)
Leuctra rickeri James
Leuctra schusteri Grubbs
Leuctra sibleyi Claassen
Leuctra tenuis (Pictet)
**Leuctra truncata* Claassen
**Leuctra variabilis* Hanson
Paraleuctra sara (Claassen)
Zealeuctra claasseni (Frison)
Zealeuctra fraxina Ricker & Ross

Family Nemouridae

Amphinemura alabama Baumann
Amphinemura delosa (Ricker)
Amphinemura nigriflora (Provancher)
Amphinemura varshava (Ricker)
Amphinemura wui (Claassen)
Ostrocerca truncata (Claassen)
Prostoia completa (Walker)
Prostoia similis (Hagen)
Soyedina calcarea Grubbs
Soyedina vallicularia (Wu)

Family Taeniopterygidae

Oemopteryx contorta (Needham & Claassen)
Strophopteryx appalachia Ricker & Ross
Strophopteryx fasciata (Burmeister)
Taenionema atlanticum Ricker & Ross
Taeniopteryx burksi Ricker & Ross

Taeniopteryx lita Frison
Taeniopteryx maura (Pictet)
Taeniopteryx metequi Ricker & Ross
Taeniopteryx parvula Banks
Taeniopteryx ugola Ricker & Ross

Family Chloroperlidae

**Alloperla aracoma* Harper & Kirchner
Alloperla caudata Frison
Alloperla chloris Frison
Alloperla hamata Surdick
Alloperla ideii (Ricker)
Alloperla imbecilla (Say)
Alloperla petasata Surdick
Alloperla usa Ricker
Haploperla brevis (Banks)
Sweltsa hoffmani Kondratieff & Kirchner
**Sweltsa lateralis* (Banks)

Family Perlidae

Acroneuria abnormis (Newman)
Acroneuria carolinensis (Banks)
Acroneuria covelli Grubbs & Stark
Acroneuria filicis Frison
Acroneuria frisoni Stark & Brown
Acroneuria hitchcocki Kondratieff & Kirchner
Acroneuria internata (Walker)
Acroneuria kirchneri Stark & Kondratieff
Acroneuria lycorias (Newman)
Acroneuria perplexa Frison
**Agneta annulipes* (Hagen)
Agneta capitata (Pictet)
Agneta flavescens (Walsh)
Eccopectura xanthenes (Newman)
Hansonoperla hokolesqua Kondratieff & Kirchner
Neoperla catharae Stark & Baumann
Neoperla choctaw Stark & Baumann
Neoperla clymene (Newman)
**Neoperla coosa* Smith & Stark
Neoperla gaufini Stark & Baumann
Neoperla occipitalis (Pictet)
Neoperla stewarti Stark & Baumann
Paragnetina immarginata (Say)
**Paragnetina kansensis* (Banks)
Paragnetina media (Banks)
Perlesta adena Stark
Perlesta cinctipes (Banks)
Perlesta decipiens (Walsh)
Perlesta ephelida Grubbs & DeWalt
Perlesta lagoi Stark
Perlesta nitida Banks

**Perlesta ouabache* Grubbs & DeWalt

**Perlesta placida* (Hagen)

Perlesta shawnee Grubbs

Perlesta teaysia Kirchner & Kondratieff

Perlinella drymo (Newman)

Perlinella ephyre (Newman)

Family Perlodidae

Clioperla clio (Newman)

Diploperla kanawholensis Kirchner & Kondratieff

Diploperla robusta Stark & Gaufin

Helopicus subvarians (Banks)

**Hydroperla fugitans* (Needham & Claassen)

**Isoperla bilineata* (Say)

Isoperla burksi Frison

Isoperla decepta Frison

Isoperla dicala Frison

Isoperla holochlora (Klapálek)

**Isoperla kirchneri* Szczytko & Kondratieff

Isoperla marlynia Needham & Claassen

Isoperla montana (Banks)

**Isoperla namata* Frison

Isoperla nana (Walsh)

Isoperla nelsoni Szczytko & Kondratieff

Isoperla orata Frison

Isoperla transmarina (Newman)

Malirekus hastatus (Banks)

Remenus bilobatus (Needham & Claassen)

Yugus kirchneri Nelson

Family Peltoperlidae

Peltoperla arcuata Needham

Tallaperla maria (Needham & Smith)

Family Pteronarcyidae

Pteronarcys biloba Newman

Pteronarcys comstocki Smith

Pteronarcys dorsata (Say)

Pteronarcys pictetii Hagen

Pteronarcys proteus Newman

New or confirmed state records

Leuctra carolinensis Claassen

Distribution. USA: MD, MS, NC, NJ, TN, VA, WV (DeWalt et al. 2015), AL, CT, PA (Grubbs 2015)

Material examined. Bell Co., Shillalah Creek, 8 June 2010, M. Floyd, 1♂, 29♀ (DCTC).

Comments. The presence of this headwater Appalachian species in eastern Kentucky was not surprising. Shillalah Creek drains Brush Mountain in the far southeastern portion of the state.

Leuctra truncata Claassen

Distribution. Canada: NF, PQ. USA: CT, ME, PA, VA, WV (DeWalt et al. 2015)

Material examined. Bell Co., Shillalah Creek, 21 September 2005, M. Floyd, 1♂, 1♀ (DCTC).

Comments. *Leuctra truncata* is still a poorly understood species that is typically collected in the adult stage during late summer and autumn. This record is near the southern extent of its known range.

Leuctra variabilis Hanson

Distribution. USA: MA, MD, ME, NH, NJ, NY, PA, VA, VT (DeWalt et al. 2015)

Material examined. Bell Co., Shillalah Creek, 21 September 2005, M. Floyd, 1♂, 1♀ (DCTC); Harlan Co., Watts Creek, Blanton Forest State Nature Preserve, 9 September–4 November 2009, M. Floyd, 4♂ (DCTC).

Comments. This species is mainly collected only during mid–late autumn (e.g. Hanson 1941, Nelson et al. 2002). The presence of *L. variabilis* in Kentucky was expected.

Alloperla aracoma Harper & Kirchner

Distribution. USA: MD (Grubbs 1997), PA, WV (DeWalt et al. 2015)

Material examined. Breathitt Co., Bookers Fork, Robinson Forest, 37.4802, -83.1403, 10 May 2010, S.A. Grubbs, 2♂ (WKUC); Harlan Co., Watts Creek, Blanton Forest State Nature Preserve, 7 June 2007, M. Floyd, 1♂, 3♀ (DCTC).

Comments. The presence of *A. aracoma* in eastern Kentucky was expected. This uncommon species is now known from the northern portion of the Cumberland Plateau of eastern Kentucky northeastward to western Maryland and southwestern Pennsylvania.

Sweltsa lateralis (Banks)

Distribution. Canada: NB, ON, PQ. USA: CT, GA, MA, MD, ME, NC, NH, NY, OH, PA, SC, TN, VA, VT, WV (DeWalt et al. 2015)

Material examined. Harlan Co., Watts Creek, Blanton Forest State Nature Preserve, 7 June 2007, M. Floyd, 1♂, 5♀ (DCTC).

Comments. The presence of this common, broadly

distributed Appalachian species in eastern Kentucky was expected.

***Agnetina annulipes* (Hagen)**

Distribution. USA: AL, DC, FL, IN, LA, MD, MS, OH, PA, SC, VA, WV (DeWalt et al. 2015)

Material examined. Bell Co., Cumberland River, Pineville, 36.7644, -83.6935, 24 June 1938, T.H. Frison & T.H. Frison Jr., 5♂ (INHS); Harlan Co., Harlan, 36.8436, -83.3217, 12 June 1940, T.H. Frison, C.O. Mohr, & A.W. Hawkins, 1♂ (INHS).

Comments. This uncommon species may no longer be present in the Cumberland River. Several trips by one of us (RED) to the Cumberland River at Pineville have produced only *Perlesta* nymphs and adults.

***Neoperla coosa* Smith & Stark**

Distribution. USA: AL, IN, NC, NY, OH, TN (DeWalt et al. 2015)

Material examined. McCreary Co., (Big South Fork) Cumberland River, Alum Ford Campground, 5 mi NW Whitley City, 36.7620, -84.5457, 5 June 1973, W.P. McCafferty & A.V. Provonsha, 12♀(PERC).

Comments. This species is likely commonly distributed across eastern and central Kentucky.

***Paragnetina kansensis* (Banks)**

Distribution. USA: AL, AR, FL, GA, IL, IN, KS, LA, MO, MS, NC, SC (DeWalt et al. 2015)

Material examined. Calloway Co., Blood River, 18 May 2000, G. Pond, 2 nymphs (DCTC); Graves Co., Terrapin Creek, 36.5016, -88.4940, 7 September 1989, P. Bagdonas, 1 nymph (INHS).

Comments. These two records are from the Jackson Purchase area in far western Kentucky.

***Perlesta ouabache* Grubbs & DeWalt**

Distribution. USA: IL, IN (DeWalt et al. 2015)

Material examined. McCreary Co., Cumberland River, Cumberland Falls State Resort Park, 36.8382, -84.3453, 12 June 1940, T.H. Frison, C.O. Mohr, & A.W. Hawkins, 1♂, 1♀(INHS).

Comments. To date this species had been collected only from a few lowland rivers in Illinois and Indiana (Grubbs & DeWalt 2011). We expect this

species is still present in Kentucky.

***Perlesta placida* (Hagen)**

Distribution. USA: AL, DC, DE, FL, GA, LA, MD, ME, MS, NC, PA, TX, VA, WV (DeWalt et al. 2015), TN (DeWalt & Heinold 2005)

Material examined. Bell Co., Cumberland River, Pineville, 36.7626, -83.6923, 24 June 1938, T.H. Frison & T.H. Frison Jr., 1♂ (INHS).

Comments. Following the revision of *Perlesta* by Stark (1989) this species was known mainly from the Gulf and Atlantic Coastal Plain region. Subsequent work has found this species further inland (e.g. Great Smoky Mountains National Park, DeWalt & Heinold 2005). One of us (SAG) has also collected this species from the Big South Fork Cumberland River in northern Tennessee. More records of this species from the Cumberland River drainage are expected.

***Hydroperla fugitans* (Needham & Claassen)**

Distribution. USA: AR, IA, IL, IN, KS, MO, TN, TX (DeWalt et al. 2015)

Material examined. McCreary Co., Cumberland River, Cumberland Falls State Resort Park, 36.8393, -84.3446, 12 May 1939, T.H. Frison & H.H. Ross, 9 exuviae (INHS); same locality but 12 June 1940, T.H. Frison & H.H. Ross, 4 exuviae (INHS); same locality but 11 May 1988, R.W. Baumann, R.F. Kirchner, B.C. Kondratieff, & C.R. Nelson, 4 exuviae (BYUC).

Comments. Nymphs and nymphal exuviae of this species have distinctive pigmentation patterns (Ray & Stark 1981, Nelson 1996). The recollection of exuviae in 1988 is evidence that this species still persists in the Cumberland River Basin. We anticipate that *H. fugitans* is in other large rivers such as the lower Green and Ohio rivers.

***Isoperla bilineata* (Say)**

Distribution. Canada: MB, NB, NF, ON, PQ, SK, USA: AL, CO, CT, FL, IA, IL, IN, KS, KY, MA, ME, MI, MN, MO, MS, NC, ND, NE, NY, OH, PA, SD, VA, WI, WV (DeWalt et al. 2015)

Material examined. Crittenden Co., Ohio River, 1.8 km WSW Weston, 37.4678, -88.0917, 17 May 1999, S.W. Chordas III & E.G. Chapman, 1♂ (OBSC).

Comments. This record confirms the presence of this riverine species in Kentucky. *Isoperla bilineata* likely is commonly distributed along the Ohio River bordering Kentucky. We have recently obtained this species from two Ohio River localities from the Indiana side of the river. We also anticipate that *I. bilineata* will be obtained from other large rivers in the state.

***Isoperla kirchneri* Szczytko & Kondratieff**

Distribution. USA: NC, NY, PA, TN, VA, WV (DeWalt et al. 2015)

Material examined. Adair Co., Damron Creek, 12 km NNE Russell Springs, R.F. Tarter Wildlife Management Area, 37.1626, -85.0690, 27 April 2002, S.A. Grubbs, 1♂, 1♀ (WKUC); Casey Co., Dry Creek, 15 km NW Liberty, 37.3992, -85.0474, 12 May 2004, S.A. Grubbs, 1♂, 1♀ (WKUC).

Comments. These represent the first confirmed records of this recently described species from Kentucky.

***Isoperla namata* Frison**

Distribution. USA: AR, IL, IN, MO, OH, OK (DeWalt et al. 2015)

Material examined. Adair Co., Casey Creek, 5 km NE Knifely, 36.2656, -85.1511, 13 April 2013, S.A. Grubbs & J.M. Yates, 1♂, 1♀ (WKUC); Taylor Co., Robinson Creek, 24 km NE Elk Horn, 37.3285, -85.2666, 13 April 2013, S.A. Grubbs & J.M. Yates, 8♂, 7♀ (WKUC).

Comments. The recent revision of eastern Nearctic *Isoperla* by Szczytko & Kondratieff (2015) did not include this species from Kentucky. These two series definitively fit the concept of *I. namata*. The ranges of *I. namata* and *I. kirchneri* overlap in central Kentucky.

Additional records – uncommon species

***Soyedina calcarea* Grubbs**

Distribution. USA: KY (DeWalt et al. 2015)

Material examined. Hart Co., spring run, Green River Preserve, 37.2550, -86.0045, 8 March 2013, S.A. Grubbs, 2♂ (WKUC).

Comments. Described from a single spring run (Grubbs 2006), *S. calcarea* appears to be restricted to

the Mammoth Cave region in central Kentucky. This is only the second known locality for this species, although several more are likely and particularly within Mammoth Cave National Park.

***Isoperla montana* (Banks)**

Distribution. Canada: NS, ON, PQ. USA: CT, DE, IN, KY, MD, ME, MN, NC, NH, NJ, NY, OH, PA, SC, VA, WV (DeWalt et al. 2015)

Material examined. Clinton Co., McIver Creek, Rolan, 36.6568, -85.0455, 19 May 2002, S.A. Grubbs, 1♂, 2♀ (WKUC).

Comments. One state locality was included in Szczytko & Kondratieff (2015), but this species likely is very commonly distributed across central and eastern Kentucky. This is only the second confirmed state record.

***Isoperla nelsoni* Szczytko & Kondratieff**

Distribution. USA: AL, GA, KY, NC, TN, VA (DeWalt et al. 2015)

Material examined. McCreary Co., Big South Fork Cumberland River, Rte. 92, Yamacraw Crossing, 36.7262, -84.5434, 27 May 2014, S.A. Grubbs, 1♂ (WKUC).

Comments. Szczytko & Kondratieff (2015) noted the inclusion of this recently-described species from Kentucky.

Species emendation

***Sweltsa hoffmani* Kondratieff & Kirchner**

Distribution. USA: AL, IN, KY, NY, OH, PA, TN, WV (DeWalt et al. 2015)

Material examined. Adair Co., tributary to Casey Creek, Rte. 551, 16 km SE Campbellsville, 37.2542, -85.1715, 27 April 2002, S.A. Grubbs, 5♂, 5♀ (WKUC); Allen Co., tributary to Garrett Creek, U.S. 231, 13 km SSW Scottsville, 36.6434, -86.2453, 28 April 2001, S.A. Grubbs, 10♂, 8♀ (WKUC); Breathitt Co., Falling Rock Branch, 23 km SE Jackson, Robinson Forest, 37.4760, -83.1379, 24 April 2004, S.A. Grubbs, 3♂, 1♀ (WKUC); Harlan Co., Brownies Creek, 24 April 2005, D.C. Tarter, 1♂, 1♀ (DCTC); Rowan Co., Claylick Branch, Hwy 801, Daniel Boone National Forest, 38.1023, -83.4960, 15 May 1998, S.A. Grubbs, 1♂, 2♀ (WKUC).

Comments. These specimens were once determined as *S. onkos* (Ricker), a species shown to be distributed mainly in the northeastern Nearctic region by Kondratieff & Kirchner (2009). *Sweltsa onkos* likely does not occur in Kentucky. Kondratieff & Kirchner (2009) included records of *S. hoffmani* from eastern Kentucky (Lawrence and Rowan Counties) but none of *S. onkos* from the state.

CONCLUSIONS

Kentucky harbors a rich stonefly fauna. The finding of 14 new or confirmed state records since the last published checklist approximately 10 years ago, with arguably only modest collecting efforts and with only one or two locality records for each species, points out that little is still known about the state-wide distribution of many species. Similar to comprehensive work carried out recently in Illinois, Indiana, Michigan, and Ohio (e.g. DeWalt & Grubbs 2011, DeWalt et al. 2012, Grubbs et al. 2012), a combination of focused collecting efforts in regions of the state with comparative little prior work and examination of material residing in museums and personal collections will provide valuable data to start the process of constructing historical and modern distribution patterns. Transcending from a state checklist to species distribution patterns is the next step.

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