NEW SPECIFIC SYNONYMS AND RECORDS OF NORTH AMERICAN CENTROPTILUM AND PROCLOEON (EPHEMEROPTERA: BAETIDAE)\(^1\)

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ABSTRACT: Eight species of North American Baetidae are placed as subjective junior synonyms as follows: among Centroptilum, \(C.\) alb\(um\) [= \(C.\) convexum and \(C.\) walshi, n. syns.\], \(C.\) bifurcatum [= \(C.\) selandrearum, n. syn.\], \(C.\) asperatum [= \(C.\) elsa and \(C.\) oreophilum, n. syns.\], among Procloeon, \(P.\) ingens [= \(P.\) implicatum, n. syn.\], \(P.\) rufostrigatum [= \(P.\) hobbsi, n. syn.\], and \(P.\) viridesculare [= \(P.\) irrubrum, n. syn.\]. Eighteen USA state records for eight species of Centroptilum and 21 state records and one Canadian province record for eight species of Procloeon are included among the 17 species reviewed and the 67 new North American collection records cited. Certain previously incorrect records are reassigned.

KEYWORDS: Ephemeroptera, Baetidae, Centroptilum, Procloeon, new synonyms

A study of the North American Baetidae genera Centroptilum Eaton and Procloeon Bengtsson (sometimes referred to as long-clawed baetids) revealed a number of new specific synonyms and considerable new distributional data. This information is detailed here along with reassignments of some previously published collection records. New species descriptions and diagnoses and keys to all North American species of Centroptilum and Procloeon will be taken up elsewhere.

New data are given here for 17 species presented alphabetically. Specific synonyms for each species are given, including eight new synonyms for six of the species. A majority of the 67 new collection citations, including 19 of the 39 new state and provincial records, are based on materials from the Purdue Entomological Research Collection (PERC). Three of these 39 records are based on corrected assignments of previously published locale data. Other collections that have been the source of new records or other materials examined are Colorado State University (CSU), Cornell University (CU), Florida A & M University (FAMU), personal collections of L. S. Long (LSL), Massachusetts Audubon Society (MAS), Missouri Department of Natural Resources (MDNR), Snow Museum of Entomology (SME), personal collection of R. S. Sarver (RS), and personal collection of N. A. Wiersema (NAW).

**CENTROPTILUM**

*Centroptilum alb*um McDunnough, 1926:189
*Centroptilum walshi* McDunnough, 1929:173, **NEW SYNONYM**
*Centroptilum convexum* Ide, 1930:222, **NEW SYNONYM**

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Remarks. Examination of numerous larvae and adults throughout much of North America has demonstrated that species concepts of *C. walshi* and *C. convexum* include intergrading color variants of *C. album*. Larvae and adults that have been attributed to the above names are structurally indistinguishable. *Centroptilum album* is one of the most geographically widespread and commonly collected species of long-clawed baetids in North America.

*Centroptilum asperatum* Traver

*Centroptilum asperatum* Traver, 1935:708
*Centroptilum elsia* Traver, 1935:713, **NEW SYNONYM**
*Centroptilum oreophilum* Edmunds, 1954:1, **NEW SYNONYM**

**Material Examined.** *Centroptilum elsia*, HOLOTYPE: reared male adult, Wyoming: Moose, VII-30-1929, EB Knots (No. 1360.1, CU); PARATYPES: two males, same data as holotype (No. 1360.3 and 4, CU). *Centroptilum asperatum*, HOLOTYPE: male adult with subimaginal exuviae, California: Big Bear L, San Bernardino Mts, VIII-29-1932, CD Michener (No. 1359.1, CU). *Baetis* No. 1 Seemann, reared female adults, California: Cobit’s Canyon, nr Claremont, Seemann (CU); larva, Napa Co, Capelle Cr at Rt 128, 2.1 mi N jet Rt 121, 1-27-1994, BC Kondratieff (CSU).

**Remarks.** Our study indicated that the type concept of *C. elsia* represents small, pale, late summer emergents of *C. asperatum*. In addition, no reliable characteristics have been found to distinguish *C. oreophilum* from *C. elsia*. This is a strictly western North American species. It also includes Seemann’s *Baetis* No. 1 taken from Riverside County, California (Seemann 1927) and the California locales cited above.

*Centroptilum bifurcatum* McDunnough

*Centroptilum bifurcatum* McDunnough, 1924:96
*Centroptilum selanderorum* Edmunds, 1954:2, **NEW SYNONYM**


**Remarks.** Initial evidence of the equivalency of *C. selanderorum* (known as adults) and *C. bifurcatum* was presented by McCafferty et al. (1993). The examination of considerable additional materials since that time has confirmed that genitalic form and coloration associated with *C. selanderorum* (Edmunds 1954) represents variability found within or between populations of the relatively widespread, mainly midwestern and western *C. bifurcatum*. The new Kansas and Kentucky records of this species extend the known midwestern range (e.g., Randolph and McCafferty 1998) south and into the fringe of the Southeast.
Centroptilum conturbatum McDunnough

Centroptilum conturbatum McDunnough 1929:171


Remarks. This species is known from central and western Canada south through the intermountain western USA.

Centroptilum minor McDunnough

Cloeon minor McDunnough, 1926:190


Remarks. This is an eastern species that in the south extends westward to Missouri and Texas.

Centroptilum ozarkensum Wiersema & Burian

Centroptilum ozarkensum Wiersema and Burian, 2000:177


Remarks. This species is currently known only from Missouri and Tennessee.

Centroptilum triangulifer McDunnough

Cloeon triangulifer McDunnough, 1931:88


Remarks. This species is found generally in the eastern half of the continent and extends westward into the Southwest as far as Oklahoma and Texas.

Centroptilum victoriae McDunnough

Centroptilum victoriae McDunnough 1938:27

Remarks. This species was first reported in name from the USA by McCafferty et al. (2002) in their inventory of Iowa mayflies. Reexamination of Maine material upon which the report of C. semirufum McDunnough by Burian and Gibbs (1991) was based, revealed that it was referable to C. victoriae. As a result, C. semirufum is currently known in the USA only from the state of Pennsylvania (Jacobs and McCaffery 2001). Historically, C. victoriae has been known primarily from central and eastern Canada.

PROCLOEON

Procloeon ingens McDunnough

Cloeon ingens McDunnough, 1923:44
Cloeon implicatum McDunnough, 1924:113, NEW SYNONYM
Procloeon implicatum (McDunnough), NEW SYNONYM

Remarks. We have found P. implicatum indistinguishable from P. ingens. Also, reexamination of material reported as P. mendax (Walsh) from Marquette County, Michigan, by Randolph and McCafferty (1998) showed it to be referable to C. ingens. This species is known from Alberta and the Yukon, east across Canada and also from a few USA states, including Colorado, Maine, and now Michigan.

Procloeon mendax Walsh

Cloeon mendax Walsh, 1862:381

Remarks. Leonard and Leonard (1962) mentioned Cloeon sp. from a small tributary of the Au Sable River in Crawford County, Michigan. Examination of this material and the figure of the genitalia of this species presented by Leonard and Leonard (1962), demonstrated it as referable to P. mendax, which otherwise is represented in Michigan only in an old report from Detroit (Wayne County) by Eaton (1887). The species has been reported infrequently from northeastern and midwestern North America.

Procloeon nelsoni Wiersema

Procloeon nelsoni Wiersema, 1999:27


Remarks. Reexamination of the larva informally referred to as Procloeon sp. 3 from Texas by McCafferty and Davis (1992) revealed that it was Referable to P. nelsoni. This species is currently known only from Texas and Tennessee.
**Procloeon pennulatum** Eaton

*Centroptilum pennulatum* Eaton, 1870:2  
*Centroptilum infrequens* McDunnough, 1924:98


**Remarks.** This widespread Holarctic species was first recognized in North America by Lowen and Flannagan (1990) by way of synonymizing *C. infrequens* with it. The species is now known from all North American regions excluding the extreme southwestern USA and Mexico (see also comments under *P. rivulare*, below).

**Procloeon rivulare** Traver

*Centroptilum rivulare* Traver, 1935:716


**Remarks.** Reexamination of materials reported as *P. pennulatum* from North Carolina by McCafferty (1993) and New Brunswick by McCafferty and Randolph (1998) are referable to *P. rivulare*. This species is known from far eastern Canada (New Brunswick and Nova Scotia), through the Appalachian chain in the USA, and westward in Kentucky, Indiana, Mississippi, and Ohio.

**Procloeon rubropictum** McDunnough

*Cloeon rubropictum* McDunnough, 1923:43


**Remarks.** This species is relatively common throughout eastern Canada and the eastern half of North America to as far west as Oklahoma, although it has yet to be reported from any states north or south of Oklahoma.
**Procloeon rufostrigatum** McDunnough

*Centroptilum rufostrigatum* McDunnough, 1924:95  
*Centroptilum bistrigatum* Daggy, 1945:389  
*Centroptilum hobbsi*, Berner, 1946:77, **NEW SYNONYM**  
*Procloeon hobbsi* (Berner), **NEW SYNONYM**


**Remarks.** Berner (1946) based his description of *C. hobbsi* on a small number of adult females from northern Florida, and he included a description of presumably associated larvae. The latter are indistinguishable from the larvae of *P. rufostrigatum*. Adult paratype material of *P. hobbsi* also proved to be equivalent to *P. rufostrigatum*. The report of *P. rivulare* from central Texas by Baumgardner et al. (1997) is referable to *P. rufostrigatum*, and reexamination of material informally referred to as *Procloeon* sp. 1 from Texas by McCafferty and Davis (1992) showed that it also is referable to *P. rufostrigatum*. This species is common in the central plains states and Manitoba, but is also known from more eastern Canada and the USA.

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**Procloeon simplex** McDunnough

*Cloeon simplex* McDunnough, 1925:185

**Records.** MISSOURI: Maries Co., Gasconade R nr Hwy 63 bridge, V-03-1989, S Humphrey (larvae, PERC, MDNR).

**Remarks.** This species is known from scattered localities in the eastern half of North America.

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**Procloeon viridoculare** Berner

*Centroptilum viridoculare* Berner, 1940:39  
*Procloeon irrubrum* Lowen and Flannagan, 1992:104, **NEW SYNONYM**

Remarks. We found that *P. irrubrum* was indistinguishable from *P. viridoculare*. This species is common in central states such as Iowa and Texas, and southeastern states such as Florida and Alabama. It is also known from a few additional midwestern and eastern states as well as Ontario.

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LITERATURE CITED


