HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS

EPHEMEROPTERA

By

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A list of parts now available appears on the back cover.
EPHEMEROPTERA

(Mayflies or Dayflies.)

By D. E. KIMMINS.

Normally two pairs of wings; anterior pair much larger than the posterior, which in some genera are much reduced in size or even entirely absent. Venation is of considerable importance in classification, and the principal veins are marked in fig. 2. The areas between the veins take the name of the main vein preceding them. Small additional veins between the main veins are termed intercalary veins. Three pairs of legs, the anterior pair in the male often very long. The abdomen terminates in two or three long, many-jointed setae, the median one in certain genera being atrophied, and the male carries a pair of jointed claspers or forceps arising from a plate on the ninth sternite. Mouth-parts completely atrophied. Compound eyes of male larger than of the female, sometimes divided, and the upper part elevated turret-like (turbinate eye).

LIFE HISTORY.

Eggs are laid in water, in small numbers at a time, or in one cluster, being washed off or dropped from the tip of the abdomen, or, as in certain species of Baetis, the female crawls beneath the surface of the water and deposits her eggs on underwater objects. The nymphs are entirely aquatic, and are of very diverse forms. Needham has divided them into two main groups, each with various subdivisions:

I. Still water forms:
   a. Climbers among vegetation, agile, streamlined forms. 
      Siphlonurus, Cloeon, etc.
   b. Sprawlers upon the bottom, silt-dwellers. 
      Caenis.
   c. Burrowers.
      Ephemera.

II. Running water forms:
   d. Agile, free-ranging, swimming forms. 
      Baetis, Ameletus.
   e. Close-clinging, flattened forms found under stones. 
      Rhithrogena, Ecdyonurus, etc.
   f. Stiff-legged, trash, moss and silt-inhabiting forms. 
      Ephemeralia.

The food of ephemeropterous nymphs consists mainly of vegetable matter—filamentous algae, diatoms and fragments of higher plants—although some species are thought to be partly carnivorous. Gills are
present on some or all of the first seven abdominal segments. These gills are of varying type and may be either filamentous or platelike, the latter being sometimes accompanied by tufted gills. Frequent mouls accompany the growth of the nymph; rudiments of wings appear when the nymph is
about half grown, and increase in size at each moult. The Ephemeroptera are unique in Insecta in that the full-grown nymph gives rise, not to an imago, but to a subimago. In this stage it is fully winged, but the wings are dull and opaque, with a fringe of minute hairs, and the legs and setae are not of the full length. Transformation from the nymph takes place on the surface of the water, on some object at the water’s edge or even beneath the surface. The subimago flies away from the water to shelter amongst vegetation, and there, after a period of rest, it moults again, to disclose the imago. The males of many species indulge in a dancing flight in swarms at certain times of the day, and mating takes place in the air. The lifecycle of many of our Ephemeroptera takes one year, although *Ephemera* certainly takes at least two years, and some other species accomplish two generations a year.

I (9). **EPHEMEROPTERA**

**Key to Families.**

1  (4)  M and Cu₁ in fore wing suddenly divergent at base (fig. 2).
2  (3)  Wings with brown markings.  A₁ in fore wing simple (fig. 2)

**Ephemeridae** (p. 5).

3  (2)  Wings not marked with brown.  A₁ in fore wing forked (fig. 3)

**Potamanthidae** (p. 5).

4  (1)  M and Cu₁ in fore wing very gradually divergent at base (fig. 4).
5  (14) Baseal segment of hind tarsus fused to tibia, leaving only four free segments (fig. 5).

6  (11) Hind wing sometimes absent or reduced in size (fig. 20), wings hyaline, margins in imago not fringed with hairs, outer fork (OF) of Rs in fore wing normal (fig. 4) or R₄ detached basally from R₅ (fig. 20).

7  (12) R₄ not detached basally from R₅ in fore wing.
8  (13) R₄ and R₅ fused in hind wing (fig. 7).

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**Figures 7-11.**

11. *Heptagenia lateralis* (Curt.). Hind tibia and tarsus.
EPHEMERIDAE

9 (10) In fore wing Cu₄ either nearer to A₁ at base or midway between Cu₁ and A₁ (fig. 4) ........................................ LEPTOPHLEBIIDAE (p. 5).
10 (9) In fore wing Cu₄ nearer to Cu₂ at base (fig. 8) ........ EPHEMERELLIDAE (p. 7).
11 (6) Hind wing absent, wings milky, fringed with minute hairs in both imago and subimagio, outer fork (OF) of Rs very deep (fig. 9) .... CAENIDAE (p. 7).
12 (7) R₄ detached basally from R₄ in fore wing (fig. 20) ........ BAETIDAE (p. 8).
13 (8) R₄ and R₅ in hind wing separate at wing margin (fig. 10) ............ STHENONURIDAE (p. 9).
14 (5) Hind tarsus with five free segments (fig. 11) .................. ECYDONURIDAE (p. 11).

Family EPHEMERIDAE.

One genus, Ephemer a L.

KEY TO SPECIES.

1 (2) Abdomen ivory white or light grey above, with brown markings as in fig. 12a. Exp. 32–46 mm. .............................................. E. danica Müller. Lakes and moderately fast rivers and streams, with a sandy or stilled bottom. Generally common. 5–9.
2 (1) Abdomen yellowish to reddish brown, markings not as above.
3 (4) Abdominal tergites V or VI–IX with pair of broad triangular brown marks (fig. 12b). Exp. 30–51 mm. ........................................ E. vulgata L. Sluggish rivers with a muddy bottom and a rather higher average temperature than for the previous species. Generally common (Midlands, Southern and Eastern England, and in Ireland). 5–8.
4 (3) Abdominal tergites V or VI–IX with three pairs of brownish longitudinal lines (fig. 12c). Exp. 30–44 mm. ......................... E. lineata Eaton. Large rivers such as the Thames. Local. 7.

The subimagines of these species may be distinguished by body markings similar to those of the imagines.

Family POTAMANTHIDAE.

There is only one species recorded from Britain, Potamanthus lutesus (L.). Exp. 25–32 mm. Large rivers such as the Thames. Imagines nocturnal and have been taken at night. Rare or local. 7.

Family LEPTOPHLEBIIDAE.

KEY TO GENERA.

1 (4) Costal margin of hind wing smoothly rounded, costal area narrow (fig. 7).
2 (3) Cu₄ in fore wing at base midway between Cu₁ and A₁ (fig. 4) .... Leptophlebia Westwood.
3 (2) Cu₄ in fore wing at base nearer A₁ than Cu₁ (fig. 13) ... Paraleptophlebia Lestage.
4 (1) Costal margin of hind wing with a strong projection about midway, costal area at base broad (fig. 14) .................. Habrophlebia Eaton.

Genus Leptophlebia Westwood.

KEY TO SPECIES.

1 (4) Imagines.
2 (3) Fore wing smoky brown, particularly towards apex. Exp. 13–23 mm. Lakes and slow streams, up to height of at least 2500 ft. Generally common. 4–6.
3 (2) Fore wing entirely hyaline. Exp. 18–21 mm. ..................... L. vespertina (L.). Lakes and small streams. Generally common. 5–8.
4 (1) Subimagines.
5 (6) Both wings brownish grey, cross-veins margined with brownish L. marginata (L).
6 (5) Fore wing mouse- or blue-grey, hind wing pale creamy grey, cross-veins not noticeably margined ..................... L. vespertina (L.).
Genus *Paraleptophlebia* Lestage.

**KEY TO SPECIES.**

1 (6) Imagines.
2 (5) Setae yellowish brown or brown.
4 (3) Male with abdominal tergites III–VI yellowish brown, translucent; longitudinal veins yellowish brown; wings of female pale smoky brown. Exp. 16–20 mm. ........................................... *P. tumida* Bengtsson. Small streams with much aquatic vegetation. Local. 5.

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EPHEMERELLIDAE

5. (2) Setae white in male, pale yellowish in female; abdominal tergites II–VII in male whitish, translucent, VIII–IX piceous. Exp. 17–19 mm.  
P. cincta (Brauer).

Rivers and large streams. Generally common. 5–8.

6 (1) Subimagines.
7 (8) Wings pale fawn, cross-veins bordered with blackish.  
P. submarginata (Stephens).
8 (7) Wings greyish, cross-veins not margined.  
9 (10) Wings mouse-grey .......................... P. tumida Bengtsson
10 (9) Wings blackish grey .......................... P. cincta (Brauer).

Genus Habrophlebia Eaton.

One species, Habrophlebia fusea (Curt.) has been recorded from Britain. 
Exp. 13–15 mm.  

Family EPHEMERELLIDAE.

One genus, Ephemarella Walsh.

KEY TO SPECIES.

1 (4) Imagines.
2 (3) Abdominal sternites I–VII or VIII with black markings (fig. 15). General colour yellowish to yellowish brown. Exp. 17–23 mm... E. notata Eaton.  
Moderately fast rivers, generally of an alkaline character. Locally common. 
5–6.
3 (2) Sternites without such markings, general colour reddish brown. Exp. 
15–23 mm.......................... E. ignita (Poda).  
Fast streams and rivers, up to at least 1500 ft. Generally common. 4–9.
4 (1) Subimagines.
5 (6) Wings pale greyish with yellowish venation, body yellowish E. notata Eaton.
6 (5) Wings dark greyish- or bluish-black, body olive-brown in male, apple-green in female .......................... E. ignita (Poda).

Family CAENIDAE.

KEY TO GENERA.

1 (2) Prosternum very narrow, fore coxae closely approximated... Caenis Stephens.
2 (1) Prosternum very broad, fore coxae widely separated... Brachycercus Curtis.

Genus Caenis Stephens.

KEY TO SPECIES.

1 (8) Imagines.
2 (5) Setae whitish or yellowish white. A small, slender, median process on apical margin of second abdominal tergite.
3 (4) First five or six tergites with blackish grey markings. Penis-lobes of male truncate (fig. 16). Exp. 8.5–11 mm. ................. C. horaria (L.).  
Large rivers, canals, lakes, where there is a silted bottom with much vegetable detritus. Imagines late evening and nocturnal in flight. Generally common. 
6–9.
4 (3) Only first three tergites with greyish markings. Penis-lobes of male with a wide excision between them (fig. 17). Exp. 6.5 mm... C. rivulorum Eaton.  
Small stony streams. Imagines fly in late evening and at night. Locally common. 
5–6, 9.
5 (2) Setae sepia-grey or greyish white. No slender, median process on second tergite.
6 (7) Base of terminal antennal bristle conically dilated. Penis-lobes with a broad sinusous excision between them (fig. 18). Exp. 7–9 mm. C. moesta Bengtsson  
Lakes, rivers and streams, with sandy or silted bottom. Imagines fly at night and in early morning. Generally common. 6–9.
I (9).  **EPHEMEROPTERA**

7 (6) Base of antennal bristle not conically dilated. Penis-lobes truncate with a narrow excision between them (fig. 19)  Exp. 8·5–15 mm.  

**C. macura** Stephens.  

Large rivers, nocturnal or early morning in flight. Locally common. 6–8.

8 (1) Subimagines.  

9 (12) Setae greyish.  

10 (11) Setae dark grey  ...........................................  **C. macura** Stephens.  

11 (10) Setae pale grey  ...........................................  **C. moesta** Bengtsson.  

12 (9) Setae white.  

13 (14) Size larger, wing exp. 8·5–11 mm.  ...........................................  **C. horaria** (L.).  

14 (13) Size smaller, wing exp. 6·5 mm.  ...........................................  **C. rivulorum** Eaton.

Genus **Brachycercus** Curtis.

There is only one species recorded from Britain, **Brachycercus harrisella** Curtis.  

Exp. 10·5–13 mm.

The imago is probably nocturnal. Rare. 6.

Family **BAETIDAE**.

**KEY TO GENERA.**

1  (4) Hind wing present, though sometimes very small.  

2 (3) Marginal intercalary veins paired (fig. 6)  ...........................................  **Baësis** Leach.  

3 (2) Marginal intercalary veins single (fig. 20)  ...........................................  **Centroptilum** Eaton.

4 (1) Hind wing absent.  

5 (6) Hind tarsus with the fused basal segment twice as long as the second (fig. 21)  ...........................................  **Cloëson** Leach.  

6 (5) Hind tarsus with the fused basal segment three times as long as the second (fig. 22)  ...........................................  **Procloëson** Bengtsson.

Genus **Baësis** Leach.

The separation of species in this genus offers considerable difficulty even in the case of males (for which this key is intended), as the characters used are not infrequently subject to variation in individuals. The production of a satisfactory key to females and subimagines must await further study.

**KEY TO SPECIES.**

1 (14) Second longitudinal vein in hind wing not forked (fig. 23) (exceptionally so in **B. buceratus** Eaton).  

2 (13) Hind wing with a costal process near base (fig. 23).  

3 (4) Forceps arched downwards in side view. Exp. 17–19 mm.  

**Rivers. Rare. 6, 9.**  

**B. buceratus** Eaton.  

4 (3) Forceps not arched downwards.  

5 (6) Setae grey, with reddish-brown annulations from base to apex. Exp. 12–25 mm.  ...........................................  **B. rhodani** (Pietet).  

**Rivers and small streams. Generally common, occurring throughout most of the year.**

6 (5) Setae whitish or greyish (if annulated, only near base).  

7 (10) Basal segment of forceps with a large callosity at inner apical angle (fig. 24).  

8 (9) Forceps stout; junction of second and third segments only slightly constricted (fig. 24). Exp. 11–19 mm.  ...........................................  **B. vernus** Eaton.  

**Rivers, possibly with a preference for alkaline waters. Generally common. 5–9.**

9 (8) Forceps slender, junction of second and third segment noticeably constricted (fig. 25). Exp. 12–17 mm.  ...........................................  **B. tenax** Eaton.  

**Rivers and small streams up to at least 1700 ft. Generally common. 4–9.**

10 (7) Basal segment of forceps with a small tooth at inner apical angle (fig. 26).


13 (2) Hind wing without a basal costal process (fig. 27). Exp. 12–16 mm.
Rivers. Rare or local. 6, 9. B. strebatinus Eaton.

14 (1) Second longitudinal vein in hind wing forked (fig. 28).

15 (16) Hind wing with three longitudinal veins, membrane somewhat milky hyaline (fig. 28) Exp. 9–17 mm. ...................... B. pumilus (Burmeister). Rivers and small streams up to at least 1500 ft. Generally common. 4–9.

16 (15) Hind wing with two longitudinal veins, membrane vitreous. Exp. 13–17 mm.
B. niger (L.).
Rivers and small streams with much aquatic vegetation. Locally common. 5–9.

Genus Centroptilum Eaton.

KEY TO SPECIES.

1 (4) Imagines.

2 (3) Hind wing acute at apex (fig. 29). Exp. 13–16 mm. . . . . C. luteolum (Müller).
Rivers, streams and stony shores of large lakes. Generally common. 4–9.

3 (2) Hind wing rounded at apex. Exp. 16–19 mm. . . . . . . . . C. pennulatum Eaton.
Streams, possibly with a preference for alkaline waters. Local. 5–10.

4 (1) Subimagines.

5 (6) Wings sahy grey ................................................. C. luteolum (Müller).

6 (5) Wings blue-grey.......................................................... C. pennulatum Eaton.

Genus Cloeon Leach.

KEY TO SPECIES.

1 (4) Imagines.


3 (2) Pterostigma with nine to eleven cross-veins; anterior margin of wing colourless in female. Exp. 17–23 mm. ...................... C. simile Eaton.
Lakes and slow streams. Generally common. 5–9.

4 (1) Subimagines.

5 (6) Wings light blackish grey ............................................. C. diplerum (L.).


Genus Procloeon Bengtsson.

One species, P. rutulum (Müller), recorded from Britain. Exp. 12–21 mm.
Lakes and slow streams. Locally common. 5–10.

Family SIPHLONURIDAE.

KEY TO GENERA.

1 (2) Hind tarsus about one and a half times as long as tibia; claws similar (fig. 5)
Siphlonurus Eaton.

2 (1) Hind tarsus slightly shorter than tibia (fig. 31); claws dissimilar
Ameletus Eaton.
SIPHLONURIDAE

Genus Siphlonurus Eaton.

KEY TO SPECIES.

1 (6) Imagines.
2 (3) Femora with a reddish-brown band externally before apex. Exp. 25–32 mm. S. linnaeaeus (Eaton).

Lakes and rivers. Local. 5–8.

3 (2) Femora not banded.
4 (5) Posterior angles of ninth tergite strongly produced in broad flat spines. Exp. 28–38 mm. S. armatus Eaton. Lakes and ponds. Rare. 5, 6, 8.

5 (4) Posterior angles of ninth tergite only slightly produced. Exp. 24–32 mm. S. laeustris Eaton. Lakes and slow streams in mountainous districts up to at least 2500 ft. Generally common. 5–9.

6 (1) Subimagines.
7 (8) Hind wings greyish with a pale border on posterior margin. S. linnaeaeus (Eaton.).

8 (7) Hind wings without pale border.
10 (9) Wings greenish grey. S. laeustris Eaton.

Genus Ameletus Eaton.

One species recorded from Britain. A. inopinatus Eaton. Exp. 20 mm. Mountain and hill streams, English Lake District and Scotland. Local. 6–7.

Family ECDYONURIDAE.

KEY TO GENERA.

1 (2) R₄ and R₅ in hind wing fused (fig. 32).
2 (1) R₄ and R₅ in hind wing separate at the margin (fig. 33).
3 (4) In male, penis-lobes outspread and boot-shaped (fig. 38). Ecdyonurus Eaton.
4 (3) In male, penis-lobes not outspread and boot-shaped.
5 (6) Penis-lobes contiguous, slightly dilated or egg-shaped (figs. 34–35).
6 (5) Penis-lobes separated by a wide U-shaped excision, cylindrical (figs. 41–42). Rhithrogena Eaton.

Genus *Arthroplea* Bengtsson.

One species, *A. congener* Bengtsson, recorded from Britain. Exp. 24 mm. *Only one British specimen known, taken at Stanmore, Middlesex, June, 1926.*

Genus *Heptagenia* Walsh.

**KEY TO SPECIES.**

1 (8) Imagines.
2 (5) Hind tarsus with basal segment shorter than second, forceps base simple (fig. 34).
3 (4) Anterior femur with two flesh-coloured rings; a small black spot on thorax above hind coxa. Exp. 25–36 mm. .................. *H. longicuda* (Stephens). Rivers; imago possibly nocturnal. Rare. 6–7.
5 (2) Hind tarsus with basal segment longer than second, forceps base toothed (fig. 35).
6 (7) A bright yellow thoracic streak directed forwards from the wing base; penislobes ovate (fig. 35). Exp. 13–32 mm. .................. *H. lateralis* (Curtis.). Rapid streams and stony shores of large lakes. Generally common. 5–9.
7 (6) No bright yellow thoracic streak; penislobes with an excision on outer margin near apex (fig. 36). Exp. 21–28 mm. .................. *H. fuscogrisea* (Retzius). Large rivers and lakes. Local. 5.
8 (1) Subimagines.
9 (12) Wings yellow or greenish yellow.

Genus *Ecdyonurus* Eaton.

**Key to Species.**

*(Imagines—males only.)*

1 (8) Imagines.
2 (3) Abdominal sternites II–VIII yellow, marked with black as in fig. 37. Exp. 21–31 mm. \(\ldots\) *E. insigne* (Eaton.).

*Large fast streams and rivers, with a preference for alkaline waters. Locally common.* 6–8.

3 (2) Sternites red or brown, not marked with black as in fig. 37.
4 (5) Forceps base untoothed (fig. 38); proportions of fore tibia to tarsus 1:1.5 approx. Exp. 24–35 mm. \(\ldots\) *E. venosus* (F.).


5 (4) Forceps base more or less toothed; proportions of fore tibia to tarsus 1:1.85 approx.
6 (7) Forceps base moderately toothed; teeth not incurved (fig. 39); penis-lobes boot-shaped. Exp. 28–32 mm. ...................... E. torrentis Kimmins. Small stony streams. Generally common. 5–6.
7 (6) Forceps base with strong incurved teeth (fig. 40), penis-lobes subtriangular. Exp. 22–32 mm. ............................................. E. dispar (Curtis). Stony rivers and stony shores of large lakes. Generally common. 5–9.
8 (1) Subimagines.
9 (10) Sternites marked with black as in imago (fig. 37) ............ E. insignis (Eaton).
10 (9) Sternites not so marked.
11 (12) Wings uniformly greyish yellow; cross-veins only very finely bordered with blackish. ......................................................... E. dispar (Curtis).
12 (11) Cross-veins strongly bordered with blackish, giving a mottled or banded appearance to the wing.

KEY TO NYMPHS

13 (14) Wing mottled with blackish ........................................... E. venosus (F.).
14 (13) Wing with more or less definite transverse blackish bands
         E. torrentis Kimmins.

Genus Rhithrogena Eaton.

KEY TO SPECIES.

1 (4) Imagines.
2 (3) Wings more or less suffused with pale golden-brown in basal half; outer apical angles of penis-lobes acute (fig. 41). Wing expanse 18–24 mm.
          R. semicolorata (Curtis).
3 (2) Wings indistinctly shaded with brownish at base; outer apical angles of penis lobes rounded (fig. 42). Wing expanse 29–33 mm.
          R. haarupi Esben-Petersen.
4 (1) Subimagines.
5 (6) Wings pale mouse-grey; hind wings paler; cross-veins not bordered
          R. semicolorata (Curtis).
6 (5) Wings pale yellowish grey; cross-veins bordered with blackish
          R. haarupi Esben-Petersen.

NYMPHS OF BRITISH EPHEMEROPTERA.

The following keys are designed for the identification of more or less mature nymphs to genera only, as our present knowledge of the nymphs of many species is still incomplete.

KEY TO FAMILIES.

1 (4) Mandibles long, extending beyond the front margin of the head, as seen from above.
2 (3) Mandibles with long divergent tusk-like processes (fig. 43) ................................ EPHEMERIDAE.
3 (2) Mandibles without such processes .............................................. POTAMANTHIDAE.
4 (1) Mandibles short.
5 (14) Eyes placed laterally; body not strongly flattened dorso-ventrally.
6 (11) Outer tails ciliate on both sides, or set with short setae.
7 (8) Seven pairs of abdominal gills .............................................. LEPTOPHLEBIIDAE.
8 (7) Five or six pairs of abdominal gills.
9 (10) Five pairs of gills, on segments III–VII .......................... EPHEMERELLIDAE.
10 (8) Six pairs of gills, on segments I–VI, the first pair rudimentary, the second large, quadrangular, covering the remaining pairs ................................ CAENIDAE.
11 (6) Outer tails ciliate on inner side only.
12 (13) Posterior angle of apical abdominal segments not produced in strong flattened spines .............................................. BÄTIDAE.
13 (12) Posterior angles of apical abdominal segments produced in strong flattened spines .............................................. Siphlonuridae.
14 (5) Eyes placed dorsally, body strongly flattened dorso-ventrally (fig. 44) .................................................. ECDYONURIDAE.

KEYS TO GENERA.

Family LEPTOPHLEBIIDAE.

1 (2) First pair of gills bifurcate, cylindrical; remaining six pairs in form of two foliate lamellae with slender acute apices (fig. 45) .................. Leptophlebia.
2 (1) All seven pairs of gills alike.
3 (4) All gills bifid, each branch simple (fig. 46) .......................... Paraleptophlebia.
4 (3) All gills bifid, each branch multifurcate (fig. 47) .................. Habrophlebia.

Family EPHEMERELLIDAE.

One genus, Ephemerella, with two species.
Family CAENIDAE.

1 (2) Ocelli set on conical processes (fig. 48) ......................... Brachycercus.
2 (1) Ocelli simple, not set on conical processes ......................... Caenis.

Family BAETIDAE.

(1) (6) Gills in the form of seven pairs of single lamellae.
(2) (3) Apex of labial palp rounded (fig. 49) ............................ Baetis.
(3) (2) Apex of labial palp truncate or slightly concave (fig. 50).
(4) (5) Gills lanceolate (fig. 51) .................................. Centroptilum luteolum (Müller).
(5) (4) Gills subtriangular, angles rounded (fig. 52) .................... Procloeon.
(8) (1) Gills with the first six pairs of lamellae double, the seventh single.
(7) (8) Lateral margins of abdominal segments 5 to 9 set with spines ....... Cloeon.
(8) (7) Lateral margins of abdominal segments 8 and 9 only set with spines

Family SIPHLONURIDAE.

1 (2) Lamellae broad, some or all doubled (fig.53) .................. Siphlonurus.
2 (1) Lamellae narrow, none doubled (fig. 54) ......................... Ameletus.

REFERENCES

Family ECDYONURIDAE.

1 (2) No tufted gills beneath lamellae.................................Arthroplea.
2 (1) Tufted gills beneath some or all lamellae.
3 (4) Hind angles of pronotum produced backward..................Ecdyonurus.
4 (3) Hind angles of pronotum more or less rectangular.
5 (6) First pair of lamellae widely separated, not touching each other ventrally
  Heptagenia.
6 (5) First pair of lamellae large, touching each other ventrally  Rhithrogena.

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ILLUSTRATIONS.

All illustrations after, or adapted from, Kimmins, 1942.
INDEX TO FAMILIES, GENERA AND SPECIES OF EPHEMEROPTERA.

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