

AN OUTLINE OF A RE-ARRANGEMENT OF THE GENERA OF  
*EPHEMERIDÆ*.

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The principal object of the present communication is the settlement of the general nomenclature of the *Ephemeridæ*. Their geographical range is only subordinate to the design; for so circumscribed are the sources whence information on this subject is obtainable, that it would not be worth one's while to treat of this alone. Doubtless the unsightly appearance of the dried insects has something to do with the carelessness with which they are regarded by most collectors, and with the scantiness of our knowledge of their distribution. My notes are limited to the recent genera; and, unless the contrary is specified, the neurature of the anterior wings alone is taken into consideration. The terminology of the neurature is that of Sundevall, as elucidated in his paper, "Om Insekternas Extremiteter," in the Stockholm Transactions for 1862.

Genus *CÆNIS*, Steph.

Syn. *Brachycercus*, Curt.; *Oxycephala*, Burm., &c.

Type *C. macrura*, Steph.

Distrib.—England, Austria, Sweden, Switzerland; N. China, Ceylon; Indiana, Florida.

Genus *TRICORYTHUS*,\* nov. gen.

Syn. *Cænis*, p., Pict.

Type *T. varicauda*, Koll. Mss.; Pict.

Distrib.—Egypt.

The type of this genus differs from *Cænis* in the neurature of the wings. The anterior rib of the vas unare is bipartite. Its posterior division is simple; but the anterior vein gives off an alternately pinnate, three-branched veinlet backwards and outwards, near its middle, and forks at the commencement of its apical fourth. These nervures are connected together by numerous cross-veinlets. The second ulnar rib is either bipartite (Savigny, fig. 6), or completely divided (*Id.* fig. 7), and each of the resulting veins sends two simple veinlets backwards to the outer margin. The anterior vas internum is simple; the posterior emits two or three simple veinlets backwards (see Savigny, in "Description de l'Égypte," ii, Névroptères, tab. 2, figs. 6 and 7). No posterior wings.

\* *Tricorythus* (Gr.)—tri-Koruthos = triple-plumed.

Genus *OLIGONEURIA*, Pict.

Type, *O. anomala*, Koll. Mss.; Pict.

The typical species has two simple ulnar ribs, and two simple\* vasa interna.

Distrib.—Brazil, 1 sp.

Section B, *O. Rhenana*, Imhoff.

The robust anterior and the slender second ulnar ribs are bipartite. The divisions (veins) of the second rib closely accompany the first and the third ribs respectively. From this last a slender vein is sent to the internal margin. Between these ribs and veins a very coarse reticulation is obscurely indicated. The anterior vas internum accompanies the third ulnar rib and its vein: the posterior is very short, and has two strong veins and a feeble one. The ulnar ribs are connected together by a few cross-veinlets. The ♂ has four-jointed forceps, whose proximal joint is upwards of twice the length of the remaining three together.

Distrib.—Central Europe, 2 sp.

Section C, *O. Trimeniana*, McLachlan.

The first and the third ulnar rib is bifid; the second is obsolescent and bipartite, as in *O. Rhenana*. The anterior division of the second rib emits a veinlet nearly parallel with the posterior division of the first rib, which vanishes before it attains the outer margin, and is met obliquely by the cross-veinlets of an obscure coarse reticulation that occupies the space between the two most prominent ribs. There are two simple vasa interna.

Distrib.—Natal, 1 sp. (♀ only known).

Genus *CAMPSURUS*,† nov. gen.

Syn. *Palingenia*, Burm., Pict., part.

Type *C. latipennis*, Walker.

Distrib.—The Amazons, 6 sp.

The first ulnar rib is bipartite; its bifurcate anterior division includes a simple supplementary vein; its posterior division separates into an anterior simple, and a bipartite veinlet. The second ulnar rib is bipartite, and is produced over the third rib to anastomose with the common

\* I am inclined to regard the first of these an ulnar; but have followed above M. Pictet's explanation of the neurature, not having seen the type.

† *Campsurus* (Gr.)—Kampse-oura = bent-tailed.

[August,

84

basis of the vasa interna. In its first fifth the third ulnar rib runs close to the first vas internum; it is then curved outwards, and sometimes receives a simple supplementary vein from before. Shortly after this, it either becomes trifid or is resolved into an anterior simple, and a posterior bipartite vein. The posterior of the moderately straight vasa interna sends a recurrent vein towards the base of the wing. From the costa to the vas ulnare inclusive the reticulation is well defined. Forceps of ♂ slender and jointless (apparently). Legs feeble and short. The two caudal setæ are horizontally patent in the dried ♂.

Section B, *C. curtus*, Hagen, = *Palingenia curta*, Hag. List of S. Americ.

Neuropt.; Smithsonian Miscel. Coll. 1861, p. 304. = *Pal. albiflora*, var., Walk. Brit. Mus. Cat.

Distrib.—The Amazons, 1 sp.

In this species the cross-veinlets are numerous throughout the extent of the anterior wings; and the forceps of the ♂ are moderately stout and two- or three-jointed.

Genus POLYMITARCTES,\* nov. gen.

Syn. *Palingenia*, Burm., part.

Type *P. virgo*, Ol.

Distrib.—Europe and Egypt, 2 or 3 sp.

The anterior ulnar rib is bifid, and is met in front, near its base, by a bipartite supplementary vein whose fork includes several veinlets. The fork of the rib includes one supplementary vein. Second ulnar rib simple. The posterior division of the bipartite third rib is itself bipartite, and is followed by upwards of four supplementary veins. These are succeeded in their turn by some irregular veinlets from the internal margin. The recurrent vein from the robust second vas internum receives two or three simple veinlets from the inner margin. Vasa interna moderately straight, and simple. Reticulation rather fine. Forceps of ♂ four-jointed; their second joints the longest.

Genus PALINGENIA, restricted, Westwood.

Syn. *Palingenia*, Burm., part.

Type *P. longicauda*, Ol.

Distrib.—Europe, 1 sp.; Asia Minor, 1 sp. ?; Silhet and Borneo, 1 sp. (three species in all); and, perhaps, one or two S. American species.

\* *Polymitarctes* (Gr.)—polymitos-arkus = a net consisting of many threads.

The neurcation of the anterior wings is somewhat like that of the preceding genus; the vasa interna, however, are connected together by a larger number of cross-veinlets. Forceps of ♂ three-jointed; their basal joints much the longest. ♀ with the central seta rudimental, not well developed, as in *Polymitarctes*.

Genus PENTAGENIA, Walsh.

Syn. *Palingenia*, Subgen. A. Walsh, 1862.

Type *P. vittigera*, Walsh.

The first ulnar rib is bipartite; its bipartite anterior, and its bifid posterior, veins, both include a simple supplementary vein in their forks, and the one in addition includes two or three supplementary veinlets. The simple posterior ulnar rib is met not far from its origin by a simple supplementary vein, which is suddenly curved forwards towards the point of contact (as in *Ephemera*). The very convex outermost veinlet from the recurrent vein of the third vas internum, which is succeeded by some very irregular, feeble veinlets, is distinctive of this genus. Forceps of ♂ four-jointed, their second joints the longest.

Genus HEXAGENIA, Walsh.

Syn. *Palingenia*, p., Pictet; *Idem* subgenus B., Walsh, 1862.

Type *H. limbata*, Guer.

Distrib.—Arctic America, Canada, United States, and the Amazons.

The most obvious differences between the neurcation of the anterior wings of *Hexagenia* and *Ephemera* are the excess in number of the more or less crowded, parallel, straight, veinlets extending from the third vas internum perpendicularly to the internal margin, over those which unite it and the second supplementary rib. The recurrent vein of the third vas internum gives off several nearly straight parallel veins. The ♂ has the second joints of the four-jointed forceps the longest, and both sexes reject the central seta.

Genus EPHEMERA, De Geer.

Syn. *Ephemera*, Lin., part.

Type *E. vulgata*, Lin.

Distrib.—Europe; N. China, Hindostan, Ceylon (aberrant); Canada, Illinois.

The forceps of *Ephemera* are similar to those of *Hexagenia*, but the central seta is sub-equal to the others. The cross-veinlets between

the second supplementary rib and the third vas internum are more numerous, and the veinlets from the third vas fewer in number, than the last genus; and, lastly, these veinlets are usually opposite to one another.

Genus *POTAMANTHUS*, Pictet, restricted.

Syn. *Potamanthus*, Pict., part.

Type *P. lutea*, Lin., Pict.

Distrib.—England, Italy, Germany, 2 sp.

The second vas internum near the base of the wing anastomoses with the third, instead of with the first, as in *Ephemera*. The third, after receiving the second, gives off a simple vein on each side. Posterior to the third vas internum there is, at the fewest, one bifid veinlet [? from the recurrent vein of the third vas]. This genus is further distinguishable from *Ephemera* by the ascalaphoid eyes of the male, and by his three-jointed forceps, whose proximal joints are much longer than the other two together.

Genus *LEPTOPHLEBIA*, Westwood.

Syn. *Potamanthus*, Pict., part.

*Baëtis*, Burm., Pict., part.

Type *L. vespertina*, Lin.

Distrib.—Lapland, Italy, England, Austria; Canada, United States, Newfoundland. New Zealand, Australia, Ceylon, Cape of Good Hope.

The vas ulnare consists of a simple posterior, and a bipartite anterior rib. Of the divisions of this last the foremost is bipartite at the commencement of its second fourth, and includes in its fork two or three supplementary veins and veinlets; whilst the other is bifurcate, and includes one such vein. A supplementary rib, very like the posterior ulnar rib, intervenes between the vasa interna and the vas ulnare. It is preceded and followed by two shorter veins. These last are united, either with the supplementary rib or with the first, very convex, vas internum. The former arrangement prevails in species inhabiting the southern hemisphere (which also usually have the marginal and sub-marginal areas coloured), the latter in the larger of the American and European species. Forceps three- or four-jointed, the basal joint the longest. Eyes of the ♂ double.\* The central seta is rather the longest.

\* Ascalaphoid.

Section B, *L. fusca*, Curt.

Distrib.—England, Switzerland, Austria (Carniola), 2 sp.

The posterior wing has the costa curiously excised in its apical half; and the basal joint of the forceps, instead of being upwards of thrice as long as the other two together, equals them in length only. So long as the subaqueous stages of development remain unknown, it seems advisable to retain the species in the genus *Leptophlebia*.

Genus *EPHEMERELLA*, Walsh.

Syn. *Potamanthus*, Pict., part.

*Baëtis*, Walker, part.

Type *E. eacruvians*, Walsh = *invaria*, Walker.

Distrib.—Hudson's Bay, Illinois, 2 sp.; England, Spain, Switzerland, Germany, 3 sp.

The neuration differs from that of *Leptophlebia* principally in the following particulars. The foremost vas internum, instead of curving forwards when it nears the base of the wing, and thus receding from the second vas internum, runs straight up to the thickened root of the wing alongside the second: it gives off a bipartite vein, and is itself bifurcate. The second vas internum is simple, the third bipartite, and united with the second by a cross-veinlet. The ♂ has 3-jointed forceps (whose second joints are the longest), and ascalaphoid eyes (Mr. Walsh says those of *invaria* are simple). In its later subaqueous stages of development the immature insect has six pairs of complex branchial appendages, which are made up of a trapezoidal plate furnished underneath with a bipartite process, which supports several imbricated lamellæ arranged lengthwise.

Genus *CLÖÖN*, Leach.

Syn. *Clœ*, Burm., Pict., part.

*Chlœon*, Lubbock.

*Clœopsis*, Etn., *olim*.

Type *C. dipterum*, Lin.

Distrib.—Lapland, Egypt, Madeira, France, Austria; N. China; 2 or perhaps 3 sp. A species (1 specimen in Brit. Mus.) is reputed to be from S. Australia.

Dipterous. During their later aquatic stages of development the insects have six double pairs and a seventh single pair of branchial plates. A series of short, solitary, supplementary veinlets is situated

on the outer margin of the wings. The ♂ has the third joints of its 4-jointed forceps the longest, and the upper divisions of its double eyes turbinate. Egg-valve of ♀ bipartite.

Genus BAËTIS,\* Leach.

Syn. *Baëtis*, B, Steph., Curtis.

*Cloë*, B, Burm.

*Brachyphlebia*, Westw.

*Cloëon*, Hagen, P., Etn.

Type *B. bioculatus*, Lin.

Distrib.—Europe; Madeira, Egypt; Hindostan; Hudson's Bay.

Section A, *B. luteolus*, Müller, = *C. translucida*, Pict.

Forceps as in *Cloëon*, egg-valve entire. Posterior wings acute, with two simple veins. Branchial plates of the aquatic insect single. A series of short, solitary, supplementary veinlets proceeds from the outer margin of the anterior wing.

Distrib.—England, Denmark, Switzerland, 1 sp.; Germany, 1 sp.

Section B, *B. bioculatus*, Lin.

Syn. *Brachyphlebia*, Westw.

Species conforming to this, the typical section of the genus, differ from the former group in the following particulars only. Anterior wings with the short supplementary veinlets on the outer margin in pairs. Posterior wings obtuse, with two or three longitudinal veins (the second of which is either simple, bifid, or bipartite, according to the species), and with more or fewer short supplementary veinlets at the apex. The fourth joint of the forceps seems never to be pyriform as it is in *Cloëon*, and in the preceding section of *Baëtis*.

Section (?) C, *B. tristis*, Hagen, = *Cloë tristis*, Hagen.

Distrib.—Ceylon.

I have only seen a ♀ sub-imagó of this species, which may typify a separate genus.

Mr. Walsh and Dr. Hagen have described several N. American species of *Cloë*, but I have not seen any representatives of the sections in which they have arranged them.

\* Probably a misreading of Baëtis, the Latin name of a Spanish river (the Guadalquivir), which is used in some atlases.

Genus BÆTISCA, Walsh.

Syn. *Baëtis*, part., Say.

Type *B. obesa*, Say.

Distrib.—United States.

The anterior ulnar rib is seemingly tri-partite. (The anterior division is probably a supplementary vein, which, with its foremost part, is bipartite, and includes a simple supplementary vein; its second division is simple). The second partition of the first ulnar rib is bifurcate, and includes a simple supplementary vein: its third partition is simple. The simple posterior ulnar rib is succeeded by two supplementary ribs, the hinder of which sends several simple veinlets, parallel one with another, to the internal margin. There are two straight, simple, vasa interna. The forceps of the ♂ seem to be 3-jointed, and to have the second joint the longest, as in *Ephemeraella* (but that which appears to be the proximal joining may be a fold in the integument only, in which case the first joint would be by far the longest, and would present an obtuse spine on its under-surface, like the first joint of the forceps of some species of *Leptophlebia*). A jointless remnant of the central seta is retained.

Genus COLOBURUS,\* nov. gen.

Syn. *Palingenia*, Burm., part., Walker.

Type *C. humeralis*, Walker.

Distrib.—New Zealand.

The vas ulnare resembles somewhat that of the preceding genus in its manner of branching. It is followed by two supplementary ribs, and two supplementary veins. The first of these ribs sends down three or four bent, simple (or slightly bifurcate), veins to the internal margin; the second of them resembles a vas internum. There are about four, slightly curved, vasa interna, some simple, others bifurcate, or even bifid. The outer setæ are upwards of fifteen times longer than the central one. The ♂ has 4-jointed forceps, their second joints are the longest; eyes double.

Genus SIPHONURUS,† nov. gen.

Syn. *Baëtis*, Ed. Pict., part.

*Ephemeræ*, Zett., part.

Type *S. flavidus*, Ed. Pict.

Distrib.—Sweden, England, Ireland, Spain, 1 sp.; Prussia, 2 sp.; United States.

\* *Coloburus* (Gr.) = stump-tailed.

† *Siphle-cera* (Gr.) = defective in the tail.

The neurulation of the fore-wings, and the proportions of the forcipal joints, are very similar to those of the last genus. But the eyes of the ♂ are simple, and the central seta is rejected. The sides of the dorsal arcus of the last well-formed segment of the abdomen are prolonged posteriorly so as to form an acute, more or less flattened, spine on each side in all of the genera from *Baëtisca* to the present genus inclusive.

Genus HEPTAGENIA, Walsh.

Syn. *Baëtis*, auct. part.

*Ecdyurus* (misspelt *Ecdyurus*) Etn.

Distrib.—N. Hemisphere; and, according to M. Blanchard, Chili.

The principal difference between this genus and the preceding, in the neurulation of the wings, is that the first of the supplementary ribs between the *vas ulnare* and *vasa interna* terminates at some distance in advance of the angle of the wing, and supplies with veinlets no part of the internal margin; that portion of the inner margin which is included by the two supplementary ribs receiving upwards of four supplementary veins and their veinlets. The first joint of the 3-jointed forceps is the longest. Egg-valve entire. Central seta rejected. Eyes entire in the male.

Type *H. flavescens*, Walsh.

Distrib.—England, 4 sp.; Germany, &c., N. America.

Lobes of the penis divergent. Wings of the sub-imago with the cross-veinlets not margined with a darker colour than that of the rest of the wing, and of the same colour as the wing until shortly before the last moult.

Section B, *H. venosa*, Fab.

Syn. *Ecdyurus*, Etn.

Distrib.—England, 3 sp.; Europe, &c.

Lobes of the penis slightly separated, horizontally flattened and triangular. Cross-veinlets in the wings of the sub-imago conspicuously margined with a darker colour, in most species. At the time when I proposed the name *Ecdyurus* for this genus, I imagined that Mr. Walsh's *Heptagenia* was a dismemberment of *Palingenia*, Burm.; but he having kindly forwarded to me, for the British Museum, types of his new genera, I find that *Heptagenia* is the same as *Baëtis*, Burm., Pict.

Having now surveyed the genera, I will attempt to point out the affinities presented by them one to another. The family seems to con-

sist, as it were, of two or three distinguishable groups welded together. Perhaps their relations may be indicated by means of punctuation: thus—

*Cænis*, *Tricorythus*, *Oligoneuria*, (*Campsurus*); *Campsurus*, *Polymirtarcs*, *Palingenia*, *Pentagenia*, *Hexagenia*, *Ephemera*; *Potamanthus*, *Leptophlebia*, *Ephemera*, *Cloëon*, *Baëtis*; (*Leptophlebia*), *Baëtisca*, *Coloburus*, *Siphonurus*, *Heptagenia*.

*Equivalents.*

1st: Wing nervures.

Costa, Sundevall = margo *antæ* antica = la costale, Pictet.

Vas sub-costale, Sundevall = sub-costa = la sous-costale, Pictet.

Vas radiale, Sundevall = radius; la médiane, Pictet.

Vas ulnare, Sundevall = ramus thyriifer, Kolenati = la sous-médiane, Pictet.

Vasa interna, Sundevall = cubitus, Kolenati = l'anale, et accessories de l'anale, Pictet = veins on the post costa, Walsh.

[Vas post costale, Sundevall = the anterior margin of the wing between the pterostigma and the cubital point, Haliday, in *Libellulide*.]

Supplementary veins are such as proceed from the *outer margin*, but do not reach the *root* of the wing, nor are derived from the principal veins of the wing.

Supplementary ribs reach the base of the wing.

2nd: Margins of Wings.

Margo antica = costa.

Margo externa = apical margin, M'Lach.

Margo interna = post costa, Walsh.

3rd: Divisions of a Vein.

Primary veins are called *ribs*,

Their *branches*, *veins*,

Their subordinate ramifications, *veinlets*.

4th: Modes of Division of Veins.

*Divided*, separating at the very commencement (e. g. *twice divided*.)

*Partite*, or *parted*, dividing almost at its origin (e. g. *bi-partite*, dividing into two).

*Fid*, dividing nearly in the middle of its length (e. g. *trifid*).

*Furcate*, or *forked*, dividing near its extremity (e. g. *bifurcate*, ending in two simple prongs).

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