

sector are pitch-black; but the costa, subcosta, and radius, together with the cross veinlets of the marginal and submarginal areas, are in opaque view bistre-grey, and in transmitted light pale golden brown, or brownish amber-colour. Setæ dull light yellowish white.

♀ (*dried*) very similar. The wings towards the base, especially in the marginal area of the fore wing, tinted with lurid.

Length of body, ♂ 17-19, ♀ 17-20; wing 18-19; setæ, ♂ 40-50 & 5, subim. 18 & 4·5, ♀ 13 & 10·5-20 & 15 mm.

Hab. Near Rock Island, Illinois, and in Texas (Walsh & M^oLach. Mus.). The part of the dorsal stripe in each segment of the abdomen is quadrangular, nearly straight at the sides, and only a little broader in front than behind.

PENTAGENIA QUADRI-PUNCTATA, Walsh.

Pentagenia quadripunctata, Walsh, Proc. Ent. Soc. Philad. ii. 198 (1863); Etn., Trans. Ent. Soc. London (1871), 64.

This species is diagnosed by Walsh as differing from *P. vittigera* in the following details. The part of the dorsal stripe in each segment of the abdomen is angulated at the sides and hexagonal in form. In the fore wing a series of four distinct fuscous dots, surrounded each by a slight cloud, is extended transversely in a slight curve from the middle of the costa to the midst of the wing (the dots presumably corresponding with bullæ), marking the subcosta and the 4th, 6th, and 9th longitudinal nervures from the costa. Wings of subimago opaque whitish. Length of body, ♂ 19, ♀ 19·5-22; wing, ♂ 15; ♀ 18-19·5; setæ, ♀ im. 22·5 & 19·5, subim. 17 & 14, ♂ subim. 15 & 3 mm.

Hab. Rock Island, Illinois.

PART II. Read February 7th, 1884.

GROUP II. OF THE GENERA.

Adult.—At the fore-wing roots the anal nervure (8) communicates with the postbrachial (7) only by means of an obsolete channel of circulation permeating the membrane in proximity to the prominent curved or angulated fold that meets the basis of the radius (3) [excepting perhaps in *Tricorythus* and *Cænis* (Pl. XV. 25 and 26). *N.B.* In Pl. IX. the figure of part of the wing of *Rhoënanthus*, 15, is defective thereabouts]. Legs all functional; hinder tarsi with 4 distinct joints, and sometimes with colour-indications of a fifth joint intimately concrete with the tibia (*i.e.* not definitely limited by suture); unguis rather small. Contour of ♂ oculi various in different sections. *Nymph.*—Palpi of both pairs of maxillæ 3-jointed. [Exceptions: palpus of maxilla I. 4-jointed in *Prosopeion*, 2-jointed in *Callibaetis*; palpus of maxilla II. with joint 3 ill defined in *Baëtis*.]

First Series of Group II.

Adult.—The anal (8) and bifid 2nd axillary nervures, together with the inner margin of the fore wing, enclose a semisagittate space; the 1st axillary nervure (9¹) connivent

with the anal at the roots, and running nearly alongside of it for some distance, presently recedes from it in a bold curve to the middle of the inner margin. Hind wings well developed, broad; the costal shoulder sharply defined, almost right-angled, and situated at about the first $\frac{1}{5}$ of the front margin; the subcosta (2) elbowed correspondingly, and approximated to the costa soon after the flexure. Thoracic spiracles straight-lipped, usually closed in dried specimens. Forceps-limbs inserted at the sides of the terminal border of a transverse laminar lobe prolonged from the segment, which lobe is represented in the ♀. Eyes of ♂ evenly contoured; anterior ocellus rather smaller than the others. *Subimago* quiescent many hours.

Section 4 of the Genera.—Type of *Potamanthus*. *Adult*.—Proximal joints of ♂ forceps-limbs many times longer than the remainder combined. *Nymph*.—Wings free along their terminal margins. Palpus of maxilla I. longer than the lacinia. Lobes of the labium smaller than the laciniæ of maxillæ II. Abdominal segments 2–7 branchiate; the gills inserted into postero-lateral prominences of the segments, and divergent backwards from the sides of the body; hinder lateral angles of the segments not prolonged. Natation laboured, aided by movements of the legs; fore legs of moderate proportions and simple construction, the femur rather shorter than the tibia.

The insects ranked in this section have strong affinity with the *Ephemeræ*. The chief differences between the flies consist in the structure of the forceps, the laminar lobe of the ♀ 9th ventral segment, and the bifurcation of the second axillary nervure of the fore wing. This last characteristic is met with in some undescribed allies of *Potamanthus*, as well as in all that have been published. The nymph has more congruity with the *Leptophlebiæ*; and the structure of the flies justifies their being grouped with these rather than with *Ephemera*.

POTAMANTHUS, Pict. 1843–5; restricted, Etn. 1871.

Illustrations. *Adult*, Pl. IX. 14 (details); (whole figures) Pict., Hist. Nat. Névropt. ii. Ephém. pl. xxv. 1–3 (1843–5). *Nymph*, Pl. XXXI. (whole figure and details); refer also to *Eucharidis*, Joly (1876), under *P. luteus*.

Adult.—Setæ 3, subequal to each other; in ♂ im. about $1\frac{1}{2}$, ♀ $1\frac{1}{3}$, and in ♂ subim. just as long as the body. Fore leg of ♂ as long as the body, the tibia $1\frac{2}{3}$ as long as the femur, and nearly as long as the tarsus; ♀ fore femur almost as long as the tibia, tarsus nearly $\frac{3}{4}$ as long as the tibia; hind tarsus about $\frac{1}{2}$ as long as the hind tibia; unguis unequal, and (excepting in ♂ fore tarsus) dissimilar. Anterior ocellus a little smaller than the others. Pronotum of ♀ transverse, produced into a flattened lobe closely appressed to the mesonotum and rounded posteriorly. Lobes of the penis flattened, without apparent stimuli. Body slender: abdominal segments of ♀ 1 and 10 short; 2–4 equal, and about twice as long as 10; 5, 6, and 9 mutually subequal, and little longer than 4; 7 and 8 mutually equal, and longer by as little as 6. Flight chiefly late in the evening and nocturnal. *Subimago* usually quiescent about twenty-four hours, standing upon its hinder legs with the fore legs mutually subparallel and horizontally prorect, the setæ close together, and the wings erect. *Nymph* latent; tracheal branchiæ all double and

uniform; their divisions subequal, plumose or pinnatisect with linear acuminate segments, and not conduplicate lengthwise. Setæ plumose, about $\frac{1}{2}$ as long as the body. Outer surface of each mandible armed with a single acute spine or tubercle, not prolonged into a tusk; their innermost fang furnished with a moveable appendage [endopodite]. Lacinia of the 1st maxilla crowned with a patch of dense hair. Median lobe of the tongue obcordate. Antennæ setaceous, almost glabrous. Labrum externally strigose. Lobes of the labium very small. Pronotum oblong, nearly straight at the sides, and slightly concave at the margin in front and behind. Intermediate leg the longest.

Type. *P. luteus* (in *Ephemera*), Linn.

Distribution. Temperate and southern Europe; also (undescribed sp.) in the State of Virginia.

Etymology, ποταμός and ἄνθος, river-flower.

POTAMANTHUS LUTEUS, Linn. Plate IX. 14 (wings, legs ♂ ♀, head, penis, and forceps ♂ adult).
Plate XXXI - nymph.

[*Ephemera*] or *Ephemera lutea* [Geof., Hist. Ab. Ins. Paris, ii. 238, no. 2] (1764); Linn., S. N. ed. xii. 906 (1767); Fab., Syst. Ent. 303 (1775); [? Schaeff., Ic. i. pl. xlvi. 7 (1776)]; Schr., En. Ins. Aust. 603 (1781); Fab., Sp. Ins. i. 383 (1782), and Mant. Ins. i. 243 (1787); Vill., C. Linn. Ent. iii. 17 (1789); Rœm., Gen. Ins. 23 (reproduced from Schaeff. 1776); [Zsch., Mus. Lesk. i. 50, no. 14] (1789); Gmel., Linn. S. N. ed. xiii. p. 2628 (1790); Ros., Fn. Etr. ii. 8 (1790); Ol., Encycl. Méthod. vi. 417 (1791); Fisch., Vers. ein. Naturgesch. v. Livland, 565 (1791); Fab., Ent. Syst. emend. iii. pars i. 68 (1793); Seetzen, Meyer Mag. f. d. Thiergesch. i. 41-63 [Hag.] (1794); Schr., Fn. Boica, Heft ii. Bd. ii. 197 (1798); Walck., Fn. Paris. ii. 8 (1802); Lat., Hist. Nat. xiii. 95 (1805); Blanch., Hist. Nat. Ins. iii. 54 (1840); Duf., Mém. par div. sav. Institut de France, viii. 580, note (1841); [Joly, Feuil. d. Jeun. Nat. 1876, Mars, pl. ii. 6 (legs misdrawn)].—? *E. marginata*, Mül., Zool. Dan. Prod. 142 (1776).—*E. reticulata*, Fourc., Ent. Paris. ii. 350 (1785).—*E. hyalina*, Pz., Explic. Schaeff. Ic. xlvi. (1804).—*E. flavicans*, ! Ramb., Névropt. 296 (1842); Walk., List of Neuropt. Ins. in Brit. Mus., part iii. 536, ? var. (1853).—*E. chlorotica*, ! Ramb., Névropt. 296 (1842); Walk., op. cit. 540 (1853).

†*Baetis mellea*, Curt., Phil. Mag. ser. 3 (1834), p. 121.—*B. marginalis*, Burm., Handb. Ent. Bd. ii. Abth. ii. 801 (1839).

Potamanthus luteus, Pict., Hist. Nat. ii. Ephém. Névropt. 208, pl. xxv. 2, 3 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 539 (1853); Hag., Stet. ent. Zeit. xxvi. 229 (1865); Etn., Trans. Ent. Soc. London, 1871, p. 76, pl. ii. 1 (wing), and iv. 13-13a [details] (1871); Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 317 (1874); Rostock, Jahresber. d. Ver. f. Naturk. Zwickau, 1877, p. 83 (1878); M'Lacn., Ent. Mo. Mag. xv. 92 (1878).

Eucharidis Reaumuri, ! N. & E. Joly, Rev. d. Sc. Nat. Montpellier, v. 314, pls. vi. 13-15, vii. 16, and viii. 30, 31 [nymph] (1876).

Subimago (living).—Wings yellow, or in the ♀ tinged with greenish grey; the fore wings rather darker towards the costa, with black cross veinlets. Eyes of ♂ light olive-green (*flavo-virens*, Müller), or sometimes light grass-green (*gramineus*, Mül.). From head to tail a broad median brownish yellow-ochreous stripe occupies most of the dorsum; this is narrowed towards the base of every abdominal segment, and contains the usual pale pair of short divergent lines and dots in each of them: the remainder of the body is sulphur- or straw-yellow, but in the abdomen near the bases of segments 2-9, close to the spiracular line, is a black dot on each side of the dorsum, and higher up in

the hinder portion of the segment in segments 1-7 is a piceous dot on each side: the penultimate ventral segment more or less brown-ochreous. Setæ chiefly brownish yellow-ochreous, becoming whitish distally; their joinings and a tinge at their roots reddish or piceous.

Imago (living).—Eyes of ♂ glaucous or olive-brown above. Body marked in a manner similar to that of the subimago. Forceps stramineous, their joinings narrowly testaceous. Coxa, trochanter, and base of the femur of the fore leg straw-yellow, the rest of the femur brownish yellow-ochreous; tibia rufo-piceous at the knee, then testaceous, but at the extremity, including the pedicel of the tarsus, piceous; tarsus fumatose with piceous joinings and subruginose unguis. Hinder legs straw-yellow, their tarsi testaceous, with the joinings and unguis subruginose. Setæ sublutescent with piceous or black joinings. Wings flavescent, with fuscous cross veinlets; these, in the pterostigmatic space of the fore wing, are numerous, sinuous, and anastomose with one another.

♀ brighter than the ♂, but otherwise very similar; the fore legs more nearly of the same colours as the hinder pairs, with their tarsal joinings dark fuscous. Length of body, ♂ 10-13, ♀ 9-13; wing, ♂ 12-13, ♀ 15; setæ, ♂ im. 18 & 15-19 & 16, subim. 13; ♀ im. 12 mm.

Hab. England, at Weybridge, Surrey (*M^cLach.*); first recorded by Curtis without locality. France, near Paris (*Geoffroy*); common near Brive (Haute Loire) at 2000 ft.; in the defile of Pierre-Lis, near Quillan (Aude) at 1100 ft.; Toulouse, at 426 ft. altitude. Switzerland, at Zurich (*M^cLach.*). Germany (*Sulz.*), Heidelberg (*Pict.*); Courland (*Brauer*), July and August. My captures at Brive and Quillan were made by beating alder trees near swift parts of the rivers in the daytime; but those at Toulouse were effected after nightfall at gas lamps in the vicinage of Pont St. Michel. The scarcity of this species in collections is probably due more to its time of flight than to its actual rarity. The nymph harbours under stones in gently flowing water at the borders of rapids.

POTAMANTHUS FERRERI. Pict.

Potamanthus Ferreri, Pict., Hist. Nat. Névropt. ii. Ephém. 203. pl. xxv. 1 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 539 (1853); Etn., Trans. Ent. Soc. London (1871), 77.

Imago (dried), ♂.—According to M. Pictet this species differs from *P. luteus* in having uniformly pale yellow setæ, colourless wings with very light yellow longitudinal nervures and translucent cross veinlets, and a strongly defined brown spot on the hinder part of the mesonotum, where *P. luteus* is often bright yellow. When he describes the dorsal stripe as composed of a series of triangular spots, one in every segment but the last, there is reason for suspecting that these triangles are truncated anteriorly. Length of body 13, exp. of wings 30, setæ 18 mm.

Hab. Captured near Turin by le Chanoine Ferrero. The unique specimen formerly in the Geneva Museum, was not there in 1867.

RHOËNANTHUS, Etn. 1881.

Illustrations. Adult (details), Pl. IX. 15.

Adult.—Setæ 2 (the median being aborted), in ♂ twice as long as the body. Legs apparently more slender than in *Potamanthus*; fore tibia of ♂ upwards of $1\frac{3}{5}$ as long as the femur, the tarsus $\frac{4}{5}$ as long as the tibia; hind tarsus scarcely $\frac{1}{3}$ as long as the tibia. Ungues unequal and dissimilar. Very like *Potamanthus* in other respects.

Type. *Rh. speciosus*, Etn.

Distribution. Dutch East Indies.

Etymology. *ρόν* and *ἀνθος*, in imitation of *Potamanthus*.

RHOËNANTHUS SPECIOSUS, Etn. Pl. IX. 15 (♂, wings, legs, penis, and forceps).

Rhoënanthus speciosus, ! Etn., Ent. Mo. Mag. xvii. 192 (1881).

Subimago (dried).—Wings whitish, tinted more or less with very light yellowish ochraceous along the inner and terminal margins; most of the cross veinlets between the costa and anal nervure (8) of the fore wing edged with blood-red.

Imago (dried), ♂.—Mesonotum brownish ochreous. Abdomen discoloured above, but varied with sanguineous; venter light yellow-ochreous. Setæ whitish ochreous, their joinings more or less sanguineous or atro-sanguineous; the forceps tinged with the same colour. Wings transparent; many cross veinlets of the fore wing are conspicuously bordered with sanguineous, and their bordering is irregularly confluent so as to form blotches of variable extent. Legs pale ochraceous; the fore leg at the tip of the femur, at both ends of the tibia, and at the tarsal joinings, tinged with red-purple or sanguineous; hinder legs with the distal edges of the tarsal joints very narrowly sanguineous.

♀ marked similarly, but less distinctly. Length of body, ♂ 13, ♀ 16; wing, ♂ 11–12, ♀ 16; setæ, ♀ 25 & 1–26 & 1 mm.

Hab. Lahat, Palembang, Sumatra (Mus. Soc. Zool. "Natura artis magistra" Leyden, and Mus. Comp. Zool. Cambridge, Mass.). Also Java (Leyden Mus.).

Second Series of Group II. of the Genera.

Adult.—The anal (8) and normally simple second axillar (9²) nervures, with the inner margin of the fore wing, enclose a trilateral space somewhat leg-of-mutton-shaped [a curved trilateral, truncate at the narrow proximal end, in *Ephemerella* and *Hagenulus*]; anal nervure distinctly separate from the pobrachial (7) at the roots; first axillar (9¹) usually projected in a simple curve from the prominent basal fold, and strongly arched towards the inner margin; but sometimes at the base of the wing it is curved forwards abruptly, tending to annex itself to the extremity of the anal nervure, thus becoming in a small degree unevenly sinuous. The area intervenient between the anal (8) and first axillar (9¹) nervures is termed the "anal-axillar interspace"; it contains from 2–5 interpolated longitudinal nervures, incurrent from the margin, termed "intercalary" or "intercalary" nervures, and designated numerically in the text (but unnumbered in the Plates) in the order of their nearness to the anal nervure. Hind wings of moderate or small proportions, either gently, and on the whole continuously, curved in front, or else suddenly refracted in the middle of the fore margin; in the former case the subcosta (2)

is curved in correspondence, but in the latter it is usually almost straight, and often subparallel with the abruptly abbreviated costa. Metathoracic spiracle straight-lipped; the valves usually closed, or connivent, in dried specimens: mesothoracic spiracle larger, the aperture narrow, and sometimes furnished with a very minute guard at its anterior corner, the lips unequal, usually gaping a little in front, the uppermost strongly vaulted and (when the guard is absent) often bent round the front of the aperture. Pronotum of ♀ closely appressed to the mesonotum, longitudinally carinate, and posteriorly excised or retuse in the middle. Forceps-limbs inserted at the sides of the terminal border of a transverse, and commonly deflexible, lobe extended from the segment, termed the "forceps-basis," and represented by a projecting lamina in the ♀, termed the "ventral lobe of segment 9." Eyes of ♂ ascalaphoid; anterior ocellus rather smaller than the others. *Subimago* quiescent during many hours, standing (so far as observed in European genera) upon all of its feet, with wings erect, and with the lateral caudal setæ spreading, or divergent from the middle seta.

Section 5 of the Genera.—Type of *Leptophlebia*. *Adult.*—Pronotum of ♀ traversed lengthwise by a raised median line or fine ridge, and excised (or at least strongly emarginate) in the middle of its posterior border. Hind tibia usually longer than the femur, rarely subequal to it; the tarsus shorter than the tibia. First axillary nervure (9¹) in some degree convergent towards the second axillary (9²) near the base of the fore wing [not obviously so in Pl. XII. 19, *Choroterpes*]. *Nymph* [out of nine genera in this Section four are unknown].—Wings free along their terminal margins. Palpus of 1st maxilla longer than the lacinia, which is crowned with a dense tuft of hair, and ciliate on the inner edge below the point. Lobes of the labium smaller than the laciniae of the 2nd maxillæ. Abdominal segments 1–7 furnished with tracheal branchiæ, those of the first segment erect. Hinder lateral angles of the posterior segments slightly produced. Natation laboured, aided by movements of the legs.

To exclude the possibility of the figures of wings being supposed to afford precise characteristics of genera, suitable for employment in analytical tabulation, variations of the most obvious features of the neuration are tediously noted in the generical descriptions. The variations in every genus proceed methodically, not at random. In view of the consequent prolixity of the descriptive text, the following aid to the determination of genera may be referred to with advantage when adult specimens require assorting.

ANALYSIS OF GENERA OF THE *Leptophlebia* TYPE:—

Hind wing in front somewhat

- arcuate; tarsal claws all narrow and hooked *Atalophlebia*.
- depressed in the middle; each tarsal claw unlike the other; median caudal seta
 subequal to the others *Leptophlebia*.
- far shorter than the others *Blasturus*.
- strongly angulated; tarsal claws
 all narrow and hooked; basal joint of forceps-limb longer than the remainder *Adenophlebia*.

- each unlike the other ; basal joint of forceps-limb longer than the remainder ; egg-valve strongly developed ; ♀ ventral lobe of segment 9 bifid and excised . *Hagenulus*.
absent ; ♀ ventral lobe of segment 9 obtuse or slightly emarginate ; of the intercalaries in the anal-axillar interspace of the fore wing, the nearest to the anal out of 4 or 5 is long..... *Thraulus*.
bifid and acutely excised ; of the intercalaries quoted, the nearest out of 4 to the anal nervure is short..... *Calliarcys*.
about as long as the remainder ; egg-valve absent ; ♀ ventral lobe of segment 9 bifid and excised ; of the intercalaries quoted, the nearest to the anal out of 3, 4, or 5 is short *Habrophlebia*.
very short ; joint 2 longer than the remainder ; ♀ ventral lobe of segment 9 obtuse *Choroterpes*.

ATALOPHLEBIA, Etn. 1881.

Illustrations. Adult (details), Pl. X. 16 *a*-16 *h*; (whole figures) see citation of Pictet under *A. australasica*. [N.B. A median seta is commonly present.]

Adult.—Hind wing in front somewhat arched, the summit of the arch obtusely subangular, situated usually before the middle of the curve; subcosta (2) strongly arched, meeting the margin very obliquely ; radius (3) usually nearly straight, constituting as it were the chord of the arch described jointly by the subcosta and the portion of the margin included between its extremity and the radius ; hence, while the narrow marginal area is broadest at the base and acuminate at its termination, the submarginal area is broadest either in the middle, or a little before the middle, and tapers gradually to its oblique apex. Cross veinlets abundant in the fore wing, those in the marginal area before the bulla well defined. At the terminal margin the longitudinal nervures are provided with curved simple branchlets, and there are no isolated veinlets. The two intercalary nervures of the anal-axillar interspace of the fore wing have simple branchlets, and usually the hinder one, close to its proximal extremity, curves forwards to unite with the other, which similarly curves forwards to join the anal nervure (Pl. X. 16 *c*) ; occasionally, especially in female specimens, a cross veinlet is transferred from near the wing-roots to establish communication between the first axillary and the anterior intercalated nervure (*l. c.* 16 *d*) ; less frequently, this last nervure annexes itself to the first axillary (*l. c.* 16 *e*). The figure 16 *i* exhibits a further departure from the normal neurulation (supposing the insect to belong to this genus). In *A. annulata* from Ceylon, the two intercalated nervures referred to are abrupt and free at their proximal extremities as a rule (*l. c.* 16 *a*), but individual "sports" occur in which the anterior nervure imperfectly establishes direct communication with the anal nervure. Guard at the orifice of the mesothoracic spiracle small and triangular. Forceps-limbs of ♂ 3-jointed ; the proximal joint much longer than the remainder, somewhat compressed, and in its basal half broadly dilated beneath ; the deflexible basis, usually prominent in the middle of its distal border, is otherwise merely emarginate ; the corresponding lobe in ♀, usually bifid and sharply excised with acute triangular points, is seldom emarginate only. Segments

6–10 constitute about $\frac{1}{2}$ of the abdomen; segment 8, the longest, is nearly equalled by segment 7; the others are successively shorter. Median caudal seta about as long as the others, seldom thrown off by specimens; outer setæ, in both sexes, usually double (in some species treble) the length of the body. Tarsal unguis all nearly alike, small, narrow, and hooked at the tip. In normal species the ♂ fore tarsus is nearly as long as the tibia, or a little longer than it, and the latter is about $1\frac{1}{2}$ as long as the femur; the ♀ fore tarsus is nearly $\frac{1}{2}$ the length of the tibia, and this about $1\frac{1}{3}$ as long as the femur; in both sexes the tarsal joints, arranged in diminishing succession, rank thus:—3, 2, 4, 5, 1. Hind tarsus usually about $\frac{1}{2}$ the length of the tibia. Some Cingalese species have the ♂ fore tarsus rather shorter than the tibia, and the joints in diminishing order rank 2, 3, 4, 5, and 1, while the hind tarsus is scarcely $\frac{1}{4}$ as long as the tibia.

Nymph unknown.

Type. *A. australis* (in *Ephemera*), Walker.

Distribution. S. Africa, Ceylon, Australasia, Japan (undescribed sp.), and S. America.

Etymology. ἀταλός and φλέβιον, in allusion to the delicacy of the cross veinlets of the wings of some species.

In the absence of female examples of most of the species, I am unable to separate satisfactorily those referred to above, as deviating from the typical form, from the others which exhibit the normal characteristics of the genus. Judging from analogy, there is much probability that the differences in the proportions of the setæ to the body, and in the proportional lengths of the joints of the limbs, distinguishable in the adult flies, are attended with manifest differences in the nymphs. The nymphs should be searched for under stones in shallow water at the borders of streams, or in proximity to the outflow of pools in river-beds, where the current is gentle. Favourable sites would be indicated by females alighting upon the water to oviposit, and by the departure from it of sub-imagines.

ATALOPHLEBIA FASCIATA, Hag. Plate LXIV. 1 (penis).

Potamanthus fasciatus, ! Hag., Verh. zool.-bot. Gesells. Wien, viii. 476 (1858) [part].

Imago (dried), ♂.—Thorax testaceous, with a brown-ochreous longitudinal stripe in the midst of the mesonotum followed by some dark blackish clouds near the peak. Abdomen very pale ochreous, approaching dull straw-colour; segments 2–8 and 10, narrowly edged at the tips with pitch-black, segments 7 and 8 ochreous-brown above, the two following yellow ochreous; venter subochraceous, slightly darkened at the joinings of the segments. Setæ clove-brown, their joinings near their insertions dark; forceps lutescent. Wings vitreous; fore wings faintly tinted with yellowish in the marginal and submarginal areas, and provided with about 20 simple slightly curved cross veinlets in the pterostigmatic space; longitudinal neuration yellowish, cross veinlets black, many of those in the anterior portion of the fore wing and some near the wing-roots edged narrowly with black. Legs fusco-lutescent, the femora banded in the middle, broadly but not strongly, with darker. Length of body 11, wing 15, setæ 35 mm.

Hab. Rainbodde, Ceylon, at an altitude of over 4000 ft. The subimago formerly attributed to this species is a female *Ephemera supposita*. The coloration of the body

of the type specimen, the subject of the above description, may have been modified by ravages of *Anthrenus* (Hag. Mus.).

ATALOPHLEBIA ANNULATA, Hag. Plate X. 16 *a* (δ , wings, legs, and genitalia).

Potamanthus annulatus, ! Hag., Verh. zool.-bot. Gesells. Wien, viii. 476 (1858).

Leptophlebia annulata, ! Etn., Trans. Ent. Soc. London (1871), 82, pl. iv. 23-23 *b*; Hag. & Etn., *op. cit.* (1873), 393-4.

Subimago (dried).—Wings brownish grey, translucent; neuration dull black, excepting that some of the longitudinal nervures are lighter in colour towards the wing-roots.

Imago (dried), δ .—Thorax and legs pitch-brown, the unguis and at least the last tarsal joint subtestaceous. Dorsum of abdomen from its extremity to almost the base of the 7th segment pitch-brown; segments 2-6 each banded with piceous and very pale translucent dull brownish yellow, the dark terminal band dilated triangularly in the middle, and the pale band at the sides; there is also a very narrow pale band at the base of the seventh segment; venter pitch-brown at the joinings and throughout the last three segments, otherwise concolorous with the pale dorsal bands. Forceps pitch-brown; setæ warm sepia-brown or fuliginose. Wings vitreous, with pitch-black neuration; the fore wings tinged slightly with piceous near the wing-roots and the great cross vein, and for a short distance in the submarginal area; the remainder of this last, and the pterostigmatic space, is faintly tinted with fuscous, and there are about 16 simple gently curved cross veinlets in this space. Length of body, δ 9-11; wing 12·5; setæ 35 & 37 mm.

Hab. Rainbodde, Ceylon, at upwards of 4000 feet altitude (Hagen Mus., & Thwaites in M'Lach. Mus.; also Brit. Mus.).

ATALOPHLEBIA TAPROBANES, Walk. Plate X. 16 *b* (penis).

†*Baëtis Taprobanes*, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 567 (1853); Hag., Verh. zool.-bot. Gesells. Wien, viii. 476 (1858).

Leptophlebia Taprobanes, ! Etn., Trans. Ent. Soc. London (1871), 82, pl. iv. 22, 22 *a* [details]; Hag. & Etn., *op. cit.* (1873), 393.

Imago (dried), δ .—Thorax pitch-black; abdomen scarcely lighter, excepting in the translucent whitish bases of segments 2-6. Setæ burnt-umber brown. Fore legs black; hinder legs dark piceous. Wings vitreous, very faintly tinted with very light bistre-grey, with a streak at the great cross vein, a spot at the wing-roots, and with the marginal and submarginal areas of the fore wing beyond the middle burnt-umber brown; neuration pitch-black. The marginal area of the fore wing contains about 8 cross veinlets before the bulla, and 18 straight and simple beyond it. Length of body, δ 12; setæ 30 (or more) mm.

Hab. Ceylon (Brit. Mus.).

ATALOPHLEBIA FEMORALIS, Hag.

Potamanthus femoralis, ! Hag., Verh. zool.-bot. Gesells. Wien, viii. 476 (1858).

Leptophlebia femoralis, Etn., Trans. Ent. Soc. London (1871), 83; Hag. & Etn., *op. cit.* (1873), 394.

Subimago (dried).—Wings transparent, pale sepia-grey, with fuscous neuration. Setæ brown.

Imago (dried).—Thorax glossy, dark chestnut-brown. Abdomen in ♂ above, as far as the base of the 6th segment, translucent whitish tinged with fuscous, the remainder fuscous, all the segments narrowly margined with pitch-black at the joinings; venter similarly pale to the seventh segment, and then fuscous or ochraceous, and likewise piceous at the joinings; in the ♀ type all is discoloured. Setæ light sepia-brown; forceps defective in the type. Legs in ♀ with pale flavescent femora banded broadly in the middle and narrowly at the tip with black, the tibiæ and tarsi pale dull burnt-umber brown; the hinder legs of ♂ are paler, with sepia-brown tibia and tarsus; its fore legs are lost. Wings vitreous, with piceous neuration and a rounded brown-tinted cloud at the wing-roots; cross veinlets in the pterostigmatic space about 10 in number in ♂, 13 in ♀. Length of body, ♂ 8; wing, ♂ 9·5, ♀ 8; setæ, ♂ about 23, ♀ 15 mm.

Hab. Rainbodde, Ceylon, at an altitude of over 4000 feet (Hag. Mus.).

ATALOPHLEBIA AUSTRALIS, Walk.

‡ *Ephemera australis*, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 538.

Leptophlebia australis, ! Etn., Trans. Ent. Soc. London (1871), 78, pl. iv. 14–14b [details].

Atalophlebia [type] *australis*, ! Etn., Ent. Mo. Mag. xvii. 193 (1881).

Subimago (dried).—Wing neuration pitch-brown, the cross veinlets bordered with light bistre-brown, their bordering in the fore wing confluent along the sides, of a lambda-shaped space free from cross veinlets and colouring, the long stroke of the letter being represented by a narrow clearing describing a gentle curve from the apex to the anal angle of the wing, and the short stroke by another narrow clearing running out from the midst of the wing-roots to the former. In some specimens the short clearing at the base of the wing is isolated by colouring from the longer clearing.

Imago (dried), ♂.—Thorax pitch-black above. Abdomen rufo-piceous above; venter dull light burnt-umber, approaching rusty brown. Setæ light rufo-piceous. Wings vitreous, their neuration light pitch-brown; the pterostigmatic space of the fore wing, tinged with greenish grey, contains many oblique nearly straight cross veinlets sparingly conjoined; the marginal area contains, approximately, 7–9 cross veinlets before the bulla, and 21 between it and the apex of the wing. Fore legs with the femur pitch-brown, the tibia pitch-black, and the tarsus light burnt-umber; hinder legs rufo-piceous, with rather lighter tarsus, and with a faint black band in the middle and another at the tip of the femur. Length of body, ♂ 7–10; wing 9–11; setæ 23 & 22 mm.

Hab. Tasmania (Brit. Mus.).

ATALOPHLEBIA AUSTRALASICA, Pict. Pl. X. 16 c (wings and penis).

‡ *Baëtis australasica*, Pict., Hist. Nat. Névropt. ii. Ephém. 189, pl. xxiv. 1, 2 (1843–5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 559.

Leptophlebia australasica, ! Etn., Trans. Ent. Soc. London (1871), 78, pls. ii. 2 [wing], and iv. 15–15b [details].

Subimago (after Pictet's figure).—Wings light black-grey, with dark neuration.

Imago (dried).—Thorax pitch-black above. Abdomen in segments 2–8 rufo-luteous marked with pitch-black, viz. each segment with an abbreviated black line from the base in the middle, a round black spot on each side of the middle at the tip, and a stripe on

each side descending obliquely from the hinder border of the segment almost to its base, dilated very broadly in front on its lower side so as to resemble somewhat a quadrangular blotch squarely excised at its lower distal angle; segment 9 pitch-black excepting at its rufo-luteous distal margin. Forceps rufo-lutescent at the base, becoming rufo-piceous distally. Setæ intense warm sepia-brown. Wings vitreous, sometimes faintly tinted with lurid in the disk; their neuration pitch-black; the marginal and submarginal areas of the fore wing tinged with burnt-umber brown, and more deeply so in the pterostigmatic space, where the cross veinlets (mostly simple) are crowded and oblique; of these there are about 8 before and 23 beyond the bulla in the marginal area. Fore legs pitch-brown; hinder legs rufo-luteous; all with two black bands on the femur. Ventral lobe of the penultimate segment of the ♀ excised. Length of body, ♂ 9-10; wing, ♂ ♀ 11; setæ, ♂ 32 mm.

Hab. Sydney, and perhaps Melbourne (Brit. Mus.).

ATALOPHLEBIA FURCIFERA, Etn.

Leptophlebia furcifera, ! Etn., Trans. Ent. Soc. London (1871), 79, pl. iv. 16-16 b [details].

Imago (dried), ♂.—Mesothorax brownish luteous above; metatergum deep sanguineous-black. Abdomen sanguineous black, with a median longitudinal line, the spiracular lines, and triangular spots, one on each side of the dorsum, adjacent to the hinder border in segments 2-6, of a lighter colour. Setæ cretaceous, with the alternate joinings black. Wings vitreous, iridescent, with piceous nervures; the pterostigmatic region of the fore wing rufo-fuscescent, with numerous simple and nearly straight cross veinlets; the other cross veinlets in the front of the fore wing, as far back as the radius and first of the sectors, bordered with rufo-fuscous; the bullæ of the subcosta and radius, and the point of furcation of the præbrachial (6), are surrounded each by a small warm-sepia nebula. Fore legs deficient; hinder legs testaceous, with two femoral bands, and the base of the trochanter fuscous. Length of body and wing, ♂ 11; setæ 13 and 16 mm.

Hab. Melbourne (McCoy). The species was forwarded to Mr. F. Walker, who referred it to me; the type may therefore be in the Melbourne Museum. The name has reference to the form of the penis.

ATALOPHLEBIA INCONSPICUA, Etn.

Leptophlebia inconspicua, ! Etn., Trans. Ent. Soc. London (1871), 79, pl. iv. 17-17 b [details].

Imago (dried), ♂.—Abdomen piceous posteriorly, paler in the intermediate segments, with small, oval, yellowish dorsal spots at the sides. Setæ fuscous, with darker joinings. Wings faintly lutescent, with piceous neuration: the pterostigmatic portion of the fore wing contains a few simple, straight, oblique cross veinlets. Legs piceous; sometimes the fore tarsi and the hinder legs are lighter. Lobes of the penis broadly flattened out and obtuse. Length of ♂, body 5-6; wing 6-7 mm.

Hab. Adelaide (Hope Mus., Oxford).

ATALOPHLEBIA DENTATA, Etn.

Leptophlebia dentata, ! Etn., Trans. Ent. Soc. London (1871), 80, pl. iv. 18-18 d [details].

Subimago (dried).—Wings very light sepia-grey, the cross veinlets very faintly and very narrowly bordered with darker grey; neuration pitch-black, but brownish at the wing-roots. Setæ deep warm sepia-brown.

Imago (dried).—Thorax bright brown-ochre above. Abdomen light bistre-brown, modified in segments 8-10 with burnt-umber, the segments narrowly bordered with black at their tips. Forceps lutescent. Setæ pilose, either lutescent or very light bistre-grey, with black joinings. Wings vitreous, the disk very faintly tinted with yellowish; marginal and submarginal areas of the fore wings coloured with dark amber-yellow (raw sienna), the submarginal wholly, the marginal area only in part, viz. from the base to the middle and in the distal portion of the pterostigmal space completely, but only in about half its breadth along the subcosta in the intervening space; the cross veinlets in the marginal area before the pterostigmal space and those in the submarginal area are bordered with dark bistre-brown, and give rise to a blotch or cloud at the bulla. Neuration mostly pitch-black, but the nervures near the wing-roots, and the stouter portions of the costa, subcosta, and radius are pitch-brown. Cross veinlets in the marginal area about 5 before and 15 beyond the bulla, all straight. Legs luteous, the fore tarsus lighter and dull, the femora more or less dark at the knee, the fore tibia black at its distal extremity, the tarsal joinings piceous. ♀. Ventral lobe of segment 9 emarginate. Length of body, ♂ 8, ♀ 7-9; wing, ♂ 11, ♀ 7-13; setæ, ♂ 18, ♀ 15-16 mm.

Hab. New Zealand (Brit. Mus.).

ATALOPHLEBIA STRIGATA, Etn. Plate X. 16 d (fore leg, ♀, and hind wing).

Leptophlebia strigata, ! Etn., Trans. Ent. Soc. London (1871), 80, pl. iv. 19 [detail, ♀].

Imago (dried), ♀.—Thorax brown-ochreous above, with two subparallel longitudinal black stripes on each side of the pronotum (one at the lateral border, and the other midway between it and the median line of the notum), and also with the longitudinal furrows in advance of the wing-roots of the mesonotum black. Abdomen light Indian red, with four longitudinal black dorsal stripes and a median black ventral line extending its whole length; each stripe is mainly composed of truncate triangular spots in mutual contiguity, one spot in every segment; but in some of the posterior segments the spots become oblong or linear, and are somewhat suffused with the ground-colour; the component spots of the two inner stripes taper behind, those of the outer stripes point forwards and downwards: the two inner stripes are rather near together, and enclose a narrow streak of the ground-colour, whose edges are even, along the track of the dorsal vessel; the outer and the inner stripes of each side are farther apart, and give a serrated outline to the interspace between them, so that the ground-colour thereabouts in every segment takes the form of an oblong spot, placed obliquely in the anterior segments, but longitudinally in the hinder segments; the outer dorsal stripe on each side is separated by a narrow interval from the spiracular borders of the segments, excepting at the extreme base of each. Setæ light brown-ochreous, with reddish brown joinings. Legs,

in opaque view, of a dull colour approaching brown-ochreous, the femora banded in the middle and distally with light burnt-umber brown, the tarsi and hinder tibiæ much lighter in colour than the femora, with a dark spot at the extremity of the fore tibia, and with the unguis, the extremities of the terminal joints, and the extreme distal edges of the remaining tarsal joints light burnt-umber, or almost madder-brown. Fore wings vitreous, with the marginal and submarginal areas, the costa, subcosta and radius, and the bases of the other longitudinal nervures light raw-umber brown, changing in transmitted light to light brownish-amber; the remainder of the longitudinal neuration and many of the cross veinlets in the outer and hinder portions of the disk of the wing are pitch-black in opaque view, changing in other lights to pitch-brown; but the stronger cross veinlets near the base and those between the great cross vein and the bulla in the marginal and submarginal areas, being slightly thickened, are more constantly black; at the wing-roots all of the strong nervures are light raw-umber or brownish amber; the marginal area contains 8 cross veinlets before and 15 beyond the bulla, all of them simple. Length of body, ♀ im. 11, wing 16, setæ 23 and 22 mm.

Hab. North Australia. This description is prepared from the original type specimen in M^oLach. Mus. The dimensions formerly attributed to it were very inaccurate.

ATALOPHLEBIA COSTALIS, Burm.

†*Baëtis*|| *costalis*, Burm., Handb. d. Ent. Bd. ii. Abth. ii. 800 (1839).

Potamanthus costalis, Pict., Hist. Nat. Névropt. ii. Ephém. 237 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 546 (1853).

Leptophlebia costalis, Etn., Trans. Ent. Soc. London (1871), 81.

Subimago (dried).—Black; thorax with a whitish line in front of the wings; abdomen and legs banded with red. Wings suffumatose, with all the cross veinlets in the marginal and submarginal areas of the fore wing brownish. Length of body, ♂ 6 Paris lines. (After Burm.)

Hab. Australia.

ATALOPHLEBIA NODULARIS, Etn. Plate X. 16 e (hind wing and two views of penis).

Leptophlebia nodularis, ! Etn., Trans. Ent. Soc. London (1871), 81, pl. iv. 20-20 c [details].

Subimago (dried).—Wings light sepia-grey, with dark neuration; cross veinlets, of the fore wing only, bordered with medium sepia, their bordering in some measure confluent in the disk near the subcostal bulla (which itself is surrounded by a darker spot), and again beyond this about midway towards the tip, so as to form an ill-defined irregular cloud enclosing a lighter space of the ground-colour.

Imago (dried), ♂.—Thorax piceous or pitch-black. Abdomen discoloured, pitch-black, with translucent subtriangular spaces in segments 2-5, one on each side of a dark median longitudinal line, extending from the base nearly to the hinder border of the dorsum. Setæ yellowish white, annulated broadly with pitch-brown in the alternate joints. Wings vitreous, with pitch-black neuration; fore wing, in opaque view, with the marginal and submarginal areas, from the great cross vein to the roots, raw-umber brown, and with narrow dark borders to the cross veinlets, nearly effaced in the disk, but subopaque in the

marginal and submarginal areas; in the submarginal area and the next behind it, in both of the places that are clouded in the subimago, three cross veinlets are nearly approximated to one in a conspicuous manner, and are very faintly clouded. Fore tibia and tarsus, in opaque view, dull luteo-rufescent, the femur obscure rufo-piceous, with a black band in the middle and another at the knee, a black spot at the extremity of the tibia, and the joinings of the tarsus narrowly black; hinder legs, in opaque view, redder, with only the band in the middle of the femur: in transmitted light the prevailing colour of the legs is brownish amber. Length of body, ♂ 9, wing 10–12, setæ 16 mm.

Hab. Christchurch, New Zealand (Fereday in M^cLach. Mus.). The present photolithograph lacks definition, and is inferior to the figure published in 1871, copied from the same original drawing.

ATALOPHLEBIA SCITA, Walk. Plate X. 16*f* (penis).

†*Baëtis scita*, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 570.

Leptophlebia scita, ! Etn., Trans. Ent. Soc. London (1871), 81, pl. iv. 21, 21 *a* [details].

Subimago (dried).—Wings dark warm sepia-grey, with black neuration; the cross veinlets of the fore wing are edged with darker grey; their scarcity behind the subcosta in the middle of the front of the disk gives rise to the appearance of a pale spot, whilst the mutual approximation of three or four about the bulla and again in the midst of the pterostigmal space produces frequently two dark spots. Setæ warm sepia-grey with black joinings.

Imago (dried), ♂.—Thorax light reddish or pitch-brown. Abdomen dark bistre-brown, the segments above broadly edged distally with black, and segments 3–6 above marked, close to the base, each with a pair of translucent yellowish triangular spots in the midst. Forceps luteous. Setæ dirty white, or light sepia-grey, annulated at the base of every alternate joint with black, the annulations gradually increasing in breadth, until, in the distal parts of the seta, each annulation occupies almost the whole of a joint. Fore femur, in opaque view, translucent raw umber-brown, with a distinct black band in the middle, and a fainter one at the tip; tibia and tarsus light rufo-luteous, with the tip of the former and joint 1 of the latter black: in transmitted light the femur becomes chiefly brownish amber, and the rest of the leg light yellowish-amber. Hinder legs amber-yellow with a black band in the middle of the femur, and with the terminal borders of the tibia and tarsal joints very narrowly edged with black. Wings vitreous, with pitch-black neuration; the fore wing with a spot at the base of the costa, and with the narrow bordering of the cross veinlets in the marginal and submarginal areas piceous; also with a less distinct spot in the marginal area at the bulla, and another in the pterostigmal space, light raw-umber or light bistre-brown. In the marginal area are 7–8 cross veinlets before the bulla and 11–13 beyond it, mostly simple and free.

♀ very similar. The cross veinlets in the marginal area of the fore wing rather more numerous than in the male (but of similar character), viz. 9 before, 18 beyond the bulla. Length of body, ♂ 6, ♀ 9; wing, ♂ 7–8, ♀ 11 mm.

Hab. New Zealand (Brit. Mus. & M^cLach. Mus.). The figure of the penis in the

present work was drawn from a specimen in the latter collection; but the earlier figure was prepared from a type specimen.

ATALOPHLEBIA CHILENSIS, n. sp. Plate X. 16 *g* (*♂*, legs and genitalia).

Subimago (dried).—Wings extremely light smoky-grey, with pitch-black cross veinlets bordered narrowly with light Cologne-earth grey, so arranged in the fore wing as to leave a blotch of the ground-colour extending from the costa to about the pobrazial (7) nervure; the longitudinal nervures pale for some distance from the wing-roots. Setæ light warm sepia-grey with pitch-black joinings.

Imago (dried), ♂.—Thorax brown-ochreous above. Abdomen discoloured, collapsed, and translucent; segments 1–6 narrowly pitch-black at the tips, with an oblique dorsal stripe on each side from the terminal border, and a spot on each side at the base fuscous. Setæ deficient. Wings vitreous, with light amber-yellow longitudinal nervures and black cross veinlets; these are thickened somewhat in the marginal and submarginal areas of the fore wing; the former area contains about 9 cross veinlets before, and 16, straight and simple, beyond the bulla. Legs, in opaque view, rufo-luteous, with the fore tibia luteous, the hinder tibiæ towards their extremities and the tarsi paler or sub-testaceous; a black band in the middle and another (or a spot) at the tip of the femur, also a spot at the tip of the tibia, pitch-black. Length of body, ♂ 10, wing 12; setæ, ♂ subim. 12 mm.

Hab. Chili (Reed, in M^oLach. Mus.).

ATALOPHLEBIA TABULARIS, n. sp. Plate X. 16 *h* (*♂* head, parts of tarsi, forceps, and penis).

Imago (in spirits), ♂.—This species, well characterized by the lobes of the penis being, as is represented in the figure, flat and obliquely pointed, so as to resemble in combination the nib of a pen flattened, has a slight projection in the middle of the terminal border of the forceps basis. Eyes clove-brown. Thorax piceous above, darker than the abdomen. Setæ whitish, with their alternate joinings dark. Femora banded with black in the middle and at the knee. Wings vitreous; the marginal area of the fore wing contains about 10 cross veinlets before the bulla, and after that 6 rather weak, followed in the pterostigmal region by 13 well-defined mostly simple and slightly curved, rarely (and then only very sparsely) connected together. Length of wing 9 mm.

Hab. Cape of Good Hope, on Table Mountain. The only specimen obtained was found in 1874, floating on the streamlet at the Platteklip. The nymph was vainly sought for in the haunts of *Telphusa*; the disuse of the net may have caused the failure.

LEPTOPHLEBIA, Westw. 1840 (*part*); *restricted*, Etn. 1881.

Illustrations. *Adult* (details) Pl. XI. 17 *a-d* (whole figures); consult Pictet, *op. cit.* pl. 26 (*Pot. Geerii & castanea*). *Nymph* Pl. XXXII.; also Pictet, *loc. cit.* (1843–5) [who omits the tracheal branchiæ of segment 1 of the abdomen].

Adult.—Hind wing in front unequally and very flatly arcuate, the curvature of the arch being strong at both ends, and interrupted by a very shallow depression nearly in its middle, immediately beyond its obtusely rounded summit; the radius (3) constitutes, as

it were, the chord of this arch ; the subcosta (2), receding in a bold curve from the radius, approaches the summit of the same arch, and then takes a nearly straight course, subparallel with the larger segment of the costal border, to terminate obliquely in the margin rather near the extremity of the radius. Hence the marginal area of that wing is sublinear, dilated in front at the base, and acuminate at the point ; while the submarginal area is broadest in its first $\frac{1}{4}$, and thence is gradually narrowed in a slight degree to its oblique, roundly truncate extremity. Cross veinlets abundant, present, but often weak, in the marginal area of the fore wing before the bulla. The longitudinal nervures are furnished with branchlets along the terminal margin, which are partly simple and curved, and partly common to both of the adjacent nervures ; there are no isolated veinlets. In the anal-axillar interspace of the fore wing, the two long intercalary nervures communicate mutually by means of cross veinlets, and exhibit the greatest possible diversity in their ultimate destination inwards. Either of them may be the longer of the two, and may annex itself to either the anal or the first axillar, while the shorter remains abrupt ; or both of them may annex themselves to the one or the other of these nervures ; or each of them may annex itself to that nervure to which it is nearest ; or both may terminate abruptly, communicating with those nervures by means of cross veinlets only. This last arrangement prevails in our native species ; but the variations from it, noted above, are quite independent of species and sex, and are apt to mar individual symmetry. Guard at the orifice of the mesothoracic spiracle small and triangular. Forceps-limbs of ♂ essentially 3-jointed (a minute terminal 4th joint is of occasional occurrence) ; the proximal joint normally much longer than the remainder, compressed and dilated towards the base ; the dilatation, usually gradual and at the lower edge, is in *L. mollis* sudden and superior. The species *L. præpedita*, provisionally referred to this genus, has 4-jointed forceps-limbs with a short joint at the base, like *Choroterpes*. Abdomen proportioned nearly as in *Atalophlebia* ; the deflexible basis of the ♂ forceps, and the homologous lobe in the ♀, are deeply and sharply excised or bifid, with acute triangular points. Median caudal seta subequal to the others ; outer setæ in ♂ about $1\frac{1}{2}$ as long as the body, in ♀ nearly of equal length with the body. Tarsal unguis all dissimilar each to the other. Fore tarsus of ♂ little longer than the tibia, which is nearly of the same length as the femur ; the joints in diminishing sequence rank 2, 3, 4, 5, and 1. Fore tarsus of ♀ about $\frac{1}{2}$ as long as the tibia, which is little longer than the femur ; its joints rank 2, 3, 5, 4 ; hind tarsus (exclusive of joint 1) almost $\frac{1}{2}$ as long as the tibia and joint 1 combined ; its joints rank 5, 2, 3, 4 ; the first joint is obsolescent in these tarsi. *Nymph* latent ; abdominal tracheal branchiæ uniform, bipartite, inserted at the latero-dorsal angles of the segments ; their divisions simple, subulate or linear-acuminate, beset with minute distant hairs ; the hinder pairs in repose widely divergent backwards from the sides of the body. Caudal setæ nearly $1\frac{1}{2}$ as long as the body, and, like the setaceous antennæ, provided with verticils of minute spreading hairs at the joinings. Fangs of the mandibles strong and acute ; appendage (endopodite) well developed, terminating in a compact oblique brush. Palpus of maxilla I slender ; its last 2 joints together constitute about $\frac{3}{5}$ of the whole. Lacinia of maxilla II acutely semi-ovate and narrow, the inner edge rather concave. Tongue broadly obovate, retuse

distally; paraglossæ obtuse, broadly dilated. Body slender, tapering evenly backwards in a small degree. Hind leg the longest; the tarsus almost as long as the tibia (excluding the claw).

Type. *L. marginata* (in *Ephemera*), Linn.

Distribution. Northern temperate regions; also (undescribed sp.) Chili.

Etymology. λεπτός and φλέβιον, from the tenuity of the cross veinlets.

I have seen nymphs of *L. submarginata*, *cincta*, and an undetermined Portuguese species alive, and some of an American (Portland, Or.) species forwarded by Dr. Hagen in spirits.

LEPTOPHLEBIA MARGINATA, Linn. Pl. XI. 17 a (wings, legs, and forceps).

Ephemera marginata, Linn., Syst. Nat. ed. xii. pars ii. 906 (1767); Fab., Syst. Ent. 303 (1775); *id.*, Sp. Ins. i. 384 (1782); *id.*, Mant. Ins. i. 243 (1787); Vill., C. Linn. Ent. iii. 17 (1789); Gmél., Linn. Syst. Nat. ed. xiii. i. pars v. 2628 (1790); Ol., Encycl. Méthod. vi. 417 (1791); Fab., Ent. Syst. emend. iii. pars i. 69 (1793); Schr., Fn. Boica, ii. pars ii. 198 (1798); Ced., Fn. Ingricæ Prodr. 134 (1798); Walck., Fn. Par. ii. 8 (1802); Lat., Hist. Nat. d. Crust. & Ins. xiii. 95 (1805); Shaw, Gen. Zool. vi. part ii. pl. lxxxi. (1806); Stewart, Elem. Nat. Hist. Anim. K. ed. ii. ii. 225, pl. xvii. 14, 15 (1817); ! Steph., Ill. Brit. Ent. vi. 57 (1835); Zet., Ins. Lap. col. 1044 (1840); Blanch., Hist. Nat. d. Ins. iii. 54 (1840).—*E. viridescens*, Fourcroy, Ent. Par. ii. 351 (1785).—*E. procellaria*, Schwarz, Nomencl. Rœs. Ins. Belust. pl. xii. 1–3 (1793–1830).—*E. stigma*, ! Steph., Ill. Brit. Ent. vi. 56 (1835).—*E. talcosa*, ! Steph., op. cit. vi. 57 (1835).

Potamanthus stigma, Pict., Hist. Nat. Névropt. ii. Ephém. 235 (1843–5); Walk., List Neuropt. Brit. Mus. part iii. 541 (1853).—*P. talcosus*, Pict., op. cit. 234 (1843–5); Walk., op. cit. 541 (1853).—*P. marginatus*, Hag., Ent. Ann. (1863), 17; *id.*, Stet. ent. Zeit. xxvi. 229 (1864); Packard, Guide to Study of Ins. ed. i. 595, fig. 577 (1870).

Leptophlebia marginata, Etn., Trans. Ent. Soc. Lond. (1871), 84, pls. ii. 2 a (wing) & iv. 25, 25 a–b [details]; Hag., op. cit. (1873), 395; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 317 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 84 (1878).

Subimago (living).—Wings either sepia-brown- or grey-black-tinted, the hinder pair either in part (towards the base) or altogether paler; cross veinlets in the fore wing and towards the terminal border of the hind wing narrowly edged with black-grey; neuration translucent yellowish.

Imago (living), ♂.—Eyes intense sepia-brown, or brown-black. Notum of thorax at first pitch-brown, changing to jet-black. Abdomen pitch-brown, with the first 4–5 dorsal joinings usually pale and translucent, the others flavescent or lutescent, and with the last two or three ventral segments as well as the ventral ganglia pitch-brown, the former with paler joinings; but sometimes the pale dorsal segments are cinereous, with dark spiracular lines and with luteous ventral ganglia. Fore legs pitch-black with cinereous or greyish tarsi; hinder legs dark pitch-brown, the tibiæ and tarsi paler and often of a pale reddish sepia-brown. Wings pellucid, with pale pitch-brown neuration, the fore wings sometimes brown-tinted in the vicinage of the pterostigmatic space. Setæ black or greyish, with the joinings very narrowly opaque. Forceps paler than the 9th segment. The reclinate appendages beneath the lobes of the penis are closely appressed to the lobes, and are obliquely truncate at the points.

♀ much like the ♂, with the fore tibiæ pale reddish luteous; abdomen opaque, pitch-brown above, and intense sepia-brown beneath. Length of body 6-12; wing 6-11; setæ, ♂ im. 12-20, subim. 9, ♀ im. 8-16 mm.

Hab. Temperate and Arctic Europe and America; also Turkestan (Fedtschenko Exp.). In cold regions the flies appear in the height of summer, elsewhere in spring, early summer, and the autumn. Mr. Albarda sent me specimens of a species found in Holland, apparently distinct from, but very nearly related to, *L. marginata*. An accidental loss of the detailed drawings precludes its description.

LEPTOPHLEBIA SUBMARGINATA, Steph.

Ephemera submarginata, ! Steph., Ill. Brit. Ent. vi. 58, no. 7 (1835).—*E. dispar*, ! id., op. cit. vi. 58, no. 8 (1835).—*E. helvipes*, ! id., op. cit. vi. 59, no. 14 (1835).

Potamanthus Geerii, Pict., Hist. Nat. Névropt. ii. Ephém. 211, pl. xxvi. 1-3 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 541 (1853); Brauer, Neuropt. Austr. 27 (1857); Hag., Ent. Ann. (1868), 18; Ausser., Ann. d. Soc. Natur. Modena, An. iv. 136 (1869).—*P. dispar*, Pict., Hist. Nat. Névropt. ii. Ephém. 234 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 542 (1853).—*P. helvipes*, Pict., Hist. Nat. Névropt. ii. Ephém. 235; Walk., List &c. part iii. 543 (1853).—*P. submarginatus*, Pict., Hist. &c. 236 (1843-5); Walk., List &c. part iii. 545 (1853).

? † *Baëtis reticulata*, Burm., Handb. d. Ent. Bd. ii. Abth. ii. 801 (1839); Pict., Nat. Hist. Névropt. ii. Ephém. 192 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 561 (1853).

† *Cloeon culiciformis*, ! Walk., op. cit. part iii. 576 (1853).

Leptophlebia helvipes, ! Etn., Trans. Ent. Soc. London (1871), 85, pl. iv. 26-26 d [details]; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 317 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 84 (1878).

Subimago (living).—Wing-membrane fawn-colour or smoke-grey, with black cross veinlets broadly edged with grey-black; these are so arranged as to leave a clear space of the ground-colour in the midst of the fore wing, extending transversely to a variable distance from the costa, and sometimes enclosing a small group of crowded cross veinlets adjacent to the bullæ; there is often another similarly pale space at the base of the wing, reaching from the anal (8) nervure to the inner margin, and from the wing-roots to the confines of the intercalar nervures of the anal-axillar interspace. Legs of ♀ piceous, with black tarsi.

Imago (living), ♂.—Eyes dull rufo-piceous or dark purple-brown above, fuscous beneath. Thorax jet-black above. Abdomen pitch-brown on the dorsum, with the joinings of the intermediate segments whitish grey; segments 7-10 darker than the preceding, and with flavescent joinings. Venter light warm sepia-brown, with joinings as above; segments 8 and 9 pitch-brown, lutescent posteriorly; dark rusty spots indicate the ventral ganglia. Forceps furfurous. Setæ warm sepia-grey, with darker joinings. Wings vitreous, with the stronger nervures furfurous or amber-brown. Fore legs black, with grey-black tarsi, or with the femur pitch-black, and the remainder black. Hind femora pitch-brown, the tibiæ and tarsi either dark warm sepia-grey, or sometimes yellowish brown or fulvescent.

♀ very like the ♂. Eyes pitch-brown. Setæ reddish brown, with dark joinings.

Length of body 9-11; wing 10-13; setæ, ♂ im. 12 & 13-14 & 16, subim. 7; ♀ im. 9-13, subim. 9 & 10-10 & 12 mm.

Hab. Great Britain; the Vosges (M'Lach.); Germany and Switzerland; in streams, lakes, and rivers. May to August. This species is easily distinguished from *L. marginata* by the form of the penis. Each of the lobes is widely dilated at its extremity; in dorsal view the dilated part is seen to be prolonged laterally into a short deflexed lanceolate projection; beneath the inner extremity of the lobe is a long slender subulate recliniate spur-like appendage.

LEPTOPHLEBIA CASTANEA, Pict.

Potamanthus castaneus, Pict., Hist. Nat. Névrop. ii. Ephém. 215, pl. xxvi. 4, 5 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 542 (1853).

Leptophlebia castanea, Etn., Trans. Ent. Soc. London (1871), 86; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 310 (1874).

This species is distinguishable from *L. submarginata* by its smaller size, its thorax being no darker than the abdomen (which is of a uniform chestnut-brown), traversed in the mesonotum by a fine longitudinal light-coloured line. Legs and setæ unicolorous light brown. Wing-nervures whitish. Eyes of ♂ brick-red above. Length of body, ♀, and setæ 8; expanse of wings 17 mm.

Hab. At a swift stream at the extremity of Lake Leman, near the *marais de Villeneuve*, at the beginning of July. (After Pictet.) In 1879 I saw a ♂ subimago, seemingly of this species, in the Museum at Lyons.

LEPTOPHLEBIA MEYERI, sp. nov. Pl. XI. 17 d (penis).

Imago (dried), ♂.—Thorax polished, deep black above. Abdomen piceous, with segments 3-6 or -7 translucent greenish-grey or brown. Wings vitreous; fore wing with the base and extremity of the costa, the subcosta and radius throughout, tinged with piceous or amber-brown; pterostigmatic space colourless, its veinlets somewhat crowded and curved, many of them also branched, with their branchlets anastomosing towards the costa. Legs dark piceous, the fore tarsus and the hinder tibiæ and tarsi blackish grey or fumatose, the last with the tips of the joints very narrowly darker. Ventral ganglia rufescent; forceps whitish; setæ fumatose or white, with rufescent joinings. Length of body 6-9; wing 7-10 mm.

Hab. Captured by Herr Meyer-Dür at Zürich and the Melch Alp, in July.—Easily recognized by the uncinate penis-lobes.

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LEPTOPHLEBIA CINCTA, Retz. Pl. XXXII. (nymph).

[*Ephemera*] or *E. cincta* [De G., Mém. pour serv. à l'hist. d. Ins. ii. pars ii. 650, pl. xvii. 17-18 (1771)]; Retz, C. De G. Gen. & Sp. Ins. 57 (1783).—*E. † nigra*, Fourcroy, Ent. Par. ii. 352 (1785).—*E. inanis*, or [*Ephemera*], [Zsch., Mus. Lesk. i. 50, no. 15 (1789)]; Gmél., Linn. Syst. Nat. ed. xiii. i. pars v. 2629 (1790); Ol., Encycl. Méth. vi. 421 (1791).—*E. † albipennis*, Fab., Ent. Syst. emend. iii. pars i. 70 (1793).—*E. † halterata*, Shaw, Gen. Zool. vi. part ii. pl. lxxxi. (1806).—*E. hyalinata*, Zet., Ins. Lap. col. 1044 (1840).

Potamanthus cinctus, Brauer, Neuropt. Austr. 27 (1857); Hag., Ent. Ann. (1863), 20; Ausser., Ann. d. Soc. Natur. Modena, Ann. iv. 137 (1869).—*P. inanis*, Pict., Hist. Nat. Névropt. ii. Ephém. 235 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 544 (1853).—*P. † halteratus*, Pict., Hist. &c. 236 (1843-5); Walk., List &c. iii. 546 (1853).—*P. hyalinus*, Pict., Hist. &c. 237 (1843-5).

Cloë fuscata, Pict., op. cit. 251, pl. xl. i. (1843-5); Oulianine, Neuropt. & Orthopt. of the Prov. of Moscow, p. 28 (1867).

Cloëon fuscata, Walk., List of Neuropt. in Brit. Mus. part iii. 573 (1853).

Leptophlebia cincta, Etn., Trans. Ent. Soc. London (1871), 87, pl. iv. 27 [detail]; Hag. & Etn., op. cit. (1873), 396; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 318 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 84 (1878).

Subimago (living).—Wings black-grey [browner when dry], with the longitudinal nervures indistinctly yellowish. Thorax pitch-brown or pitch-black. Abdomen in segments 2-7 cinereous, the posterior segments fuscous, the joinings narrowly greyish-white.

Imago (living), ♂.—Upper eyes warm sepia-brown; lower eyes black. Thorax jet-black above. Abdomen seldom, or in large examples, uniformly raw umber- or pitch-brown above, usually so in segments 8-10 only, and in segments 2-7 vitreous; these are often faintly lutescent towards their hinder borders, their tracheæ are partly black near the spiracles, and the ventral nervous ganglia somewhat rusty; joinings of the opaque segments either light yellowish or reddish. Setæ and forceps whitish, the latter blackish grey towards the base, and sometimes 4-jointed instead of 3-jointed. Penis-lobes slightly divergent distally, each with a short acute projection on the outer side near the tip, and a long slender acuminate reclinate spur beneath (figured by me in 1871). Legs white or cretaceous, the fore femora darker than the hinder, the tibiæ and tarsi in some lights slightly tinged with testaceous. Wings vitreous; the stronger longitudinal nervures in opaque view faintly amber-colour (becoming pitch-brown in the dried insect); the marginal area of the fore wing in specimens of average or large size contains 10-14 very faint cross veinlets before the bulla, and beyond it 18-26, mostly stronger than the others, slightly sinuous, and in the pterostigmal region commonly branched irregularly and anastomosing near the costa; in small examples there are about 8 before and 16 beyond the bulla, and the latter are sinuous, but less irregular than those of large specimens.

♀ (living).—Subsimilar to the ♂, with the stronger nervures of the wings piceous; the marginal area of the fore wing contains in large examples about 16 cross veinlets before, and 25-27 beyond the bulla; in small specimens, about 9 cross veinlets before, and 18-20 beyond the bulla; these in the pterostigmal region are chiefly sinuous and generally simple. Abdomen fusco-piceous, with yellowish joinings; the setæ and legs testaceous, the hinder tarsi whitish. Length of body 7-8; wing 8-9; setæ, ♂ im. 8 & 9-8 & 11, subim. 9 & 7; ♀ im. 7 & 10-8 & 11 mm.

Hab. Northern and temperate Europe; in streams and rivers during the summer and autumn. Pictet probably confused this species with *Habrophlebia lauta* (to which his description of *Potamanthus † cinctus* applies) because it was mingled with a *Habrophlebia* in his collection, and is found in the neighbourhood of Geneva. In September 1879 I found both of these species beside a stream at Troinex, near Mt. Salève.

LEPTOPHLEBIA VACIVA, sp. nov.

Subimago (dried).—Wings dark sepia-grey, with light reddish brown longitudinal nervures. Setæ sepia-grey. Legs of ♀ in opaque view yellowish testaceous; in transmitted light yellowish amber-colour.

Imago (dried), ♂.—Thorax jet-black above, at the sides pitch-black. Abdominal segments 2–6 and the base of segment 7 transparent white, with opaque white joinings and burnt-umber brown ventral ganglia, the other segments pitch-brown above; segment 8 beneath is more of a warm sepia-brown, and segment 9 somewhat rusty or reddened, the colouring extending a little into the forceps-basis. Setæ transparent, white; forceps-limbs cretaceous, tapering gradually from the base. Lobes of the penis slender, each with a single short and slender acuminate barb-like lateral appendage or process, projecting outwards obliquely at some distance before the tip. Fore legs in opaque view bistre-brown or pitch-brown, changing in transmitted light to brownish amber; hinder legs in a large measure transparent whitish, but tinged with a similar brownish tint towards the distal extremities of the femora and the extreme bases of the tibiae, as well as in a still fainter degree towards the extremities of the tarsi. Wings vitreous, with the stronger longitudinal nervures light pitch-brown, changing with light transmitted to brownish amber; in the pterostigmatic space of the fore wing are about 8–12 slightly curved cross veinlets of a like colour, mostly simple and thickened towards the subcosta; in the remainder of the marginal area the cross veinlets are very indistinct. Length of body, ♂ 7·5, wing 8 mm.

Hab. Mt. Hood, Oregon (McLach. Mus.).

LEPTOPHLEBIA MOLLIS, Hag. MS. Plate XI. 17 b (forceps, from side and wings).

Cloë mollis, ! Hag., MS. (1861).

Leptophlebia mollis, ! Etn., Trans. Ent. Soc. London (1871), 88, pl. iv. 28 [details].

Subimago (dried).—Wings very light brownish white. Thorax dark brownish.

Imago (dried).—♂. Thorax above either pitch-black, luteo-piceous, or rufo-piceous. Abdomen in segments 2–7 translucent whitish, the tips of the dorsal and sometimes also of the ventral segments greyish, and the ventral ganglia rufescent; segments 10–8 and the extremity of segment 7 rufo-piceous or luteo-piceous. Forceps-limbs dilated somewhat suddenly towards the base. Coxæ and fore femora towards the tips in opaque view somewhat light testaceous or rufo-piceous, changing in transmitted light to pale amber; hinder femora lighter; the rest of the legs dirty whitish, the fore tibia at its extremities slightly testaceous, and in some lights changing throughout to dull yellowish amber. Wings vitreous, the neuration mostly colourless, but the subcosta, great cross vein, and base of the costa in some lights slightly discoloured. Setæ whitish or greyish, dark or reddish at the joinings.

♀. Body polished, dark pitch-brown, the dorsal abdominal segments darker at the joinings. Setæ white. Legs all whitish, only faintly discoloured towards the ends of the femora. Wing-nervures more nearly colourless than in the ♂. Length of body 6–7, wing 8; set. ♂ im. about 11; ♀ im. about 6 mm.

Hab. New Hampshire, on Mount Washington (M^cLach. Mus.), and in May at Amherst (Mus. Comp. Zool. Cambridge, Mass.). Also West Farms, N. Y.; Worcester, Mass.; and North Carolina (in the same collections). Two examples are ticketed Washington Territory in M^cLach. Mus.

LEPTOPHLEBIA MEMORIALIS (renamed).

Leptophlebia || *pallipes*, ! Hag., Ann. Rep. U. S. Geolog. and Geograph. Survey of the Terr. 1873, part iii. Zool. 582 (1875).

Imago (dried), ♀.—Body pitch-brown; the head rather brighter and redder or chestnut-brown, but pitch-black at the orbits of the ocelli, in two depressions behind them on the vertex, and in the middle of the occipital crest; thorax rather darker at the sides; abdomen growing darker above in segs. 7-10, the first segment broadly and the others narrowly bordered with pitch-black at the tips above; the spiracular line dark, the ventral lobe of the 9th segment pale, bifid, with elliptical segments. Wings vitreous, with almost colourless neuration; the longitudinal nervures, distally, tinged faintly with very pale brownish; marginal area of the fore wing with about 8 evanescent cross veinlets before the nodal point, and about 17 (only well defined in the pterostigmal space) beyond it, mostly simple and almost straight. Legs pale yellowish white, the femora faintly tinged with brownish distally, the fore coxa pale, the hinder coxae pitch-brown, the first three tarsal joints faintly brown-tinted. Length of body 6, wing 7 mm.

Hab. Truckee, Nevada, in the Sierra Nevada (G. R. Crotch, in Mus. Comp. Zool. Cambridge, Mass.). With a low power, the legs in some lights seem uniformly pale brownish white. The name *pallipes* having been preoccupied by Walker in the unrestricted genus *Leptophlebia*, I have assigned another to this species, which has reference to its original captor, whose untimely death was primarily due to exposure in the course of the expedition when the insect was obtained.

LEPTOPHLEBIA DEBILIS, Walk.

‡*Baetis debilis*, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 569 (1853); Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 46.

The description of this "museum species" was based upon a single ♀ imago, whose generical affinities were misunderstood by Mr. Walker. In 1871 I cited it as synonymous with ‡*Palingenia concinna*, ‡*P. pallipes*, and probably with ‡*Ephemera hebes* of the same author (*i. e.*, *Blasturus cupidus*, Say); but having re-examined the type specimen, I now believe it to be a *Leptophlebia*, not yet definitely described.

LEPTOPHLEBIA GREGALIS, sp. nov.

Subimago (dried).—Fore wings very light brownish grey, with the stronger nervures in opaque view dull light rufu-piceous; in some other positions their colour is that of the membrane. Hind wings whitish grey, with yellowish white neuration. Setæ light brownish grey. Legs rather paler than in the imago.

Imago (dried).—♂. Body reddish pitch-brown; thorax sometimes nearly pitch-black

above; abdominal joinings opaque. Setæ rusty whitish or drab, with their bases rusty. Forceps-limbs light rusty-brown. Inferior spurs of the penis-lobes obliquely deflected, broadly compressed and acuminate. Legs rufescent brown, changing to rufescent amber in transmitted light; the fore tarsus, and the tibiæ and tarsi of the hinder legs, rather lighter than the remainder. Wings vitreous, with the longitudinal neuration and the opaque cross-veinlets of the pterostigmal space of the fore wing light rufo-piceous; these are somewhat irregular and variable, sometimes sparsely branched and anastomosing, and are about 12–16 in number.

♀ very similar to the ♂. Setæ whitish. Hind tibiæ and tarsi whitish, with the extreme base of the tibia, the unguis, terminal joint, and the distal borders of the other joints of the tarsus, rufescent brownish. Wings nearly as in ♂, but the nervures posterior to the cubitus of the fore wing are practically colourless; the marginal area contains about 10 weak cross veinlets between the great cross vein and the bulla, and 17–21 (mostly stronger) beyond that; these are usually simple, and many of them tapering towards the costa are slightly curved. Length of body 8, wing, ♂ 8–9, ♀ 7–9, setæ, ♂ 14 mm.

Hab. Mount Hood, Oregon (M^cLach. Mus.).

LEPTOPHLEBIA RUFIVENOSA, sp. nov.

Subimago (dried), ♀.—Wings transparent, light yellowish brown-grey; their neuration in opaque view light ferruginous brown, changing in transmitted light to rufo-piceous. Setæ (Vandyke) brownish grey.

Imago (dried), ♀.—Body brownish piceous, or dark rufo-piceous, with the joinings of the abdominal segments of empty specimens opaque. Setæ somewhat lighter than in the subimago, with the joinings towards the roots, in large examples, opaque and narrowly rufo-piceous. Fore femur in opaque view intense (ferruginous) brown-ochre, the tibia and tarsus much lighter or somewhat testaceous; the leg reflects a warm ferruginous tint; in transmitted light the femur and tibia are of a ferruginous amber-colour, the trochanter and tarsus paler. Hinder legs rather lighter than the fore legs. Wings transparent, the membrane lightly and uniformly tinted, and the neuration strongly coloured with ferruginous ochre, the latter reflecting a reddish or golden brown and transmitting a rich amber-colour. The marginal area of the fore wing contains 7–8 cross veinlets before the bulla, and 17–20 beyond it; those in the pterostigmal region are simple and slightly sinuous in small specimens, but in large examples are apt to be irregular in some degree, and to anastomose in parts with one another. Length of body, ♀ 6–8, wing 7–10, setæ im. 8–10 mm.

Hab. Mount Hood; Washington Territory (M^cLach. Mus.); S. Raphael, Cal. (Osten-Sacken, in Mus. Comp. Zool. Cambridge, Mass.), March 7th.

(?) LEPTOPHLEBIA PRÆPEDITA, sp. nov. Plate XI. 17 c (forceps and penis, in two positions).

Subimago (dried).—Wings sepia-grey, with pitch-brown neuration. Setæ sepia-brown.

Imago (dried), ♂.—Thorax jet-black above; abdomen pitch-brown, sometimes light

pitch-brown, with joinings 2-7 opaque; venter probably lighter than the dorsum, and more of a warm sepia-brown. Setæ warm sepia-brown. Legs pitch-brown, the fore tarsus and the hinder legs rather lighter than the fore femur. Wings vitreous, with a faint brownish grey tint; their neuration, in opaque view pitch-brown, transmits a brown amber-colour; the marginal area of the fore wing contains 3-7 indistinct cross veinlets before the bulla, and 11-14, mostly well defined, beyond it, those in the pterostigmal region are simple and usually slightly curved. The form of the genitalia is noteworthy. Length of body 5, wing 5-6 mm.

Hab. Dedham, Mass. (McLach. Mus.). The apparent presence of a short joint next to the basis in the forceps-limbs is the sole cause of my hesitation in ranking this species in *Leptophlebia*.

I have seen specimens of several other North-American species of *Leptophlebia*, but not sufficient for their description.

BLASTURUS, Etn. 1881.

Illustrations. Adult (details) Pl. XI. 18. Nymph Pl. XXXIII., see also (?) *B. vespertinus*, L., below.

Adult.—Similar to *Leptophlebia* in the form and neuration of the wings, the structure of the mesothoracic spiracle, the ♂ genitalia (in the known species conformable to those of *L. marginata*), the ventral lobe of the 9th ♀ abdominal segment, the legs, and the unguis of the tarsi; differing from that genus in the proportional lengths of the caudal setæ, which vary with the species. Median seta considerably shorter than the others; outer setæ in ♂ 2-3 times as long as the body, median from $\frac{3}{5}$ -1 the length of the body; outer setæ in ♀ $1\frac{1}{3}$ - $1\frac{4}{5}$, median $\frac{1}{2}$ - $\frac{3}{10}$ as long as the body.

Nymph (judging from its structure) latent; abdominal tracheal branchiæ diversiform, foliaceous and fringeless; those of segment 1 bifid, with minutely hairy linear-lanceolate divisions; those of the other 6 pairs reclinate upon the sides of the dorsum, and formed of jugate, obliquely subovate, tail-pointed lamellæ, whose cusps are minutely hairy at the edges, and are traversed longitudinally by the main tracheæ of the lamellæ. The following slight differences are noticeable in the outlines of these lamellæ:—in those of segments 2-6 the outer division of the twin lamella, at the base of the cusp, is incised on one side and has a sinus on the other side, while the inner division is incised on both sides of the cusp; but in those of segment 7 are no incisions. Caudal setæ defective in the specimens examined. Fangs of the mandibles in a large measure similar to those of *Leptophlebia*; the endopodite slender, somewhat abrupt, and furnished with a slender brush of hair. Palpus of maxilla I. slender; the last 2 joints together constitute little more than half of the whole. Lacinia of maxilla II. broad, nearly in the form of the quadrant of a circle. Tongue rotundly subquadrate; paraglossæ broadly rounded. Abdomen slightly dilated in the middle; hinder lateral angles of segments 8 and 9 shortly and acutely produced. Hind leg a little the longest; the tarsus (excluding the claw) $\frac{1}{2}$ as long as the tibia.

Type. *B. cupidus* (in *Ephemera*), Say.

Distribution. Temperate N. America, and perhaps Scandinavia.

Etymology. βλαστάνω and οὐρά, from the median caudal seta resembling one that is sprouting forth and not fully developed.

The wings of *Blasturus* figured in Pl. XI. belonged to a large specimen; in those of smaller examples the branchlets of the nervures along the terminal margin are less intricate, as a rule, and similar to those shown in the illustration of *Leptophlebia*. The nymphs were communicated to me by Dr. Hagen, and were identified generically mainly by the wing-neuration and stature of specimens of mature growth, taken into consideration with their native localities. No aid towards the discrimination of the species described is afforded by the shape of the penis in the dried insects.

BLASTURUS CUPIDUS, Say. Plate XI. 18 (adult wings and legs), XXXIII. (nymph?).

Ephemera cupida, Say, West. Quart. Rep. ii. 163 (1823); Le Conte, Complete Writings of T. Say, i. 172 (1859).—*E. Hebes*, Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 538 (1853)?.

Palingenia pallipes! & *concinna*,! Walk., op. cit. 553 (1853).

Potamanthus cupidus & *concinnus*, Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 51; (*cupidus*), Walsh, Proc. Acad. Nat. Sc. Philad. (1862), 372; Hag., Proc. Ent. Soc. Philad. ii. 172 (1863); ^{Walsh,} ~~15~~ *† Baëtis ignava*! Hag., Smithson, &c. 47 (1861).

Leptophlebia cupida (part),! Etn., Trans. Ent. Soc. London (1871), 89, pls. ii. 2 b & iv. 29–29 b [details]; Packard, in 3rd Rep. U.S. Ent. Com. chap. xi. (part) pls. xlvi.-xlvii. [morphology] (1883).

Blasturus cupidus!, Etn., Ent. Mo. Mag. xvii. 193 (1881).—*B. concinnus*,! id., in the writing of Pl. XI.

Subimago (dried).—Wings light sepia-grey, with dark neuration, but with the membrane and neuration at the wing-roots and in the axillary area of the fore wing, and to a larger extent at the base of the hind wing, paler or even dull yellowish whitish, especially in the ♀. Median seta in ♂ rather more than $\frac{1}{2}$ as long as the outer setæ, and so in the ♀, but in a less degree.

Imago (dried).—Median seta about $\frac{1}{4}$ as long as the outer setæ in the ♂, and about $\frac{1}{3}$ in the ♀. Pterostigmal portion of the fore wing tinged slightly with brownish in the ♂; marginal area in the ♂ with 9–15 (commonly 10) cross veinlets before the bulla and 27–33 beyond it, but in the ♀ 9–13 before and 19–23 beyond (counting along the subcosta); those in the pterostigmal region rather irregular, somewhat curved, and sometimes forked and anastomosing near the costa.

♂. Thorax pitch-black, varied at the sides and beneath with rufo-piceous. Abdomen discoloured; dorsum pitch-brown, with narrow yellowish joinings, sometimes varied with rufo-piceous in aged cabinet specimens, often in some degree translucent in the midst; venter in segments 2–8 pale dull rufo-piceous or subtestaceous, segment 9 rufo-piceous; forceps dull yellowish brown or rufo-testaceous, sometimes darkened distally. Fore legs dark pitch-brown, the tarsi sometimes lighter; hinder legs in opaque view either light pitch-brown or (in a specimen from Milford, N.H.) dull bronze-brown, changing in transmitted light to deep amber and light yellow-amber respectively. Wing-neuration light pitch-brown, changing in transmitted light to rufous or light amber; the cross veinlets before the bulla in the marginal area of the fore wing very indistinct.

♀. Head rufescent, the vertex with a large pitch-black blotch in the midst on the occipital border, and another about the ocelli. Thorax piceous above, the pronotum

varied with slightly prominent rufescent markings. Abdomen discoloured, the venter rather redder than the dorsum. Setæ sepia-grey, annulated at the joinings with piceous, the median seta lighter than the others; the annulations of the outer setæ towards the roots, and again towards the tips, are subequal to one another in breadth, but many in the intervening portion of the seta are alternately narrow and broad. Wings vitreous, tinted very slightly throughout, and in the distal portions of the marginal and submarginal areas of the fore wing rather more perceptibly, with light yellowish-brownish; neuration pitch-brown, changing to golden brown in transmitted light, but lighter in colour in the parts corresponding with the paler regions of the subimago's wings. Fore legs pitch-brown; the hinder legs rather lighter and more nearly rufescent- or lutescent-piceous in opaque view, changing in transmitted light to rufous; in some lights the tarsi appear browner than the tibiæ, and these, in their turn, lighter than the femora.

Variety (from North Carolina).—Wings of subimago more nearly uniformly sepia-grey, and somewhat darker in tint than in normal specimens. Wings of imago clearer, and in the ♂ not tinged with brownish in the pterostigmatic region; their neuration lighter in colour.

Length of body 9-11; wing 10·5-12; setæ, ♂ im. about 30 & 7, subim. about 11 & 7; ♀ im. 17 & 6, subim. about 13 & 7 mm.

Hab. Cincinnati, Ohio (Say); Nova Scotia and (?) Newfoundland (Walker); Canada, West Farms, N. Y., and Mt. Washington, N. H. (M^cLach. Mus.); Milford, N. H., Andover, Me., and Morganton, N. C. (Hagen Mus.). The variation in colour of the N. C. examples noted above may prove to be merely due to the advanced age of individual subimagines, and premature death of imagines, respectively.

BLASTURUS GRAVASTELLUS, sp. nov.

Subimago (dried).—Wings light grey, with dark neuration; the base of the hind wing and the axillary region of the fore wing very little paler than the remainder of the membrane, although the main nervures are rather pale towards the roots.

Imago (dried).—Median seta of ♂ about $\frac{1}{2}$ as long as the outer setæ; that of ♀ about $\frac{2}{3}$ or $\frac{3}{4}$ as long as the outer. Pterostigmatic portion of the fore wing very faintly obscured in ♂; the marginal area in ♂ contains 7-9 cross veinlets before the bulla and 19-22 beyond it, in ♀ 9-11 before and 19-24 beyond the bulla; those in the pterostigmatic space are slightly curved, and often branch irregularly in parts so as to anastomose with one another near the costa.

♂. Very similar to *B. cupidus*; pleuræ and sternum varied in a lesser degree with rufo-piceous; dorsum of abdomen more uniformly pitch-brown; venter less brightly coloured, segments 7 and 8 unicolorous, segment 9 not at all strongly contrasted in colour with those preceding it; forceps unicolorous, light testaceous; setæ sepia-grey, annulated with piceous at the joinings, the annulations narrower and less unequal in breadth than those of *B. cupidus* ♀. Fore legs in opaque view uniformly pitch-brown; hinder legs luteo-piceous, changing in transmitted light to golden brown or rich amber, with the extreme edges of their tarsal joinings faintly darker. Fore wings vitreous;

neuration in opaque view for the most part colourless, but the subcosta and radius as well as the distal portion of the costa light umber-brown, changing in transmitted light to pale brownish amber.

♀. Head as in *B. cupidus*. Thorax pitch-brown above; pronotum pitch-black in the middle, but towards the sides lighter than that of *B. cupidus*. Setæ subsimilar to those of the same species, but of a warmer tint. Wings vitreous, not tinted in the pterostigmatic space; neuration not so dark as in *B. cupidus*. Fore legs in opaque view light pitch-brown, with the trochanter and base of the tibia dull pale yellowish brown, and the tarsus more opaque than the tibia; the femur and tibia reflect a rufo-piceous tint, the tarsus a dark reddish brown: in transmitted light their prevailing colour is dark amber-brown. Hinder legs in opaque view either apparently of lighter shades of the same colours as the fore legs, or more of a light bistre-brown; their reflection is raw umber-brown; in transmitted light their colour is yellow-amber, and the tarsal joinings are narrowly opaque. Length of body 8-10; wing 8-12; setæ, im. ♂ 17 & 8-18 & 9, ♀ 12 & 9.5-17.3 & 13 mm.

Hab. Montana (M^cLach. Mus.). A species smaller and lighter in colour than *B. cupidus*.

BLASTURUS NEBULOSUS, Walk.

Palingenia nebula, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 554 (1853).

Potamanthus nebulosus, Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 52; Walsh, Proc. Ent. Soc. Philad. ii. 193, note 13, 194, note 15 (1863).—*P. odonatus*, Walsh, Proc. Acad. Nat. Sc. Philad. (1862), 372; Hag., Proc. Ent. Soc. Philad. ii. 171 (1863).

Leptophlebia nebula, ! Etn., Trans. Ent. Soc. London (1871), 89, pl. v. 1-1 a [details].

Imago (dried) ♂.—Thorax jet-black above. Abdomen pitch-brown above, dull light burnt-umber brown beneath. Forceps either uniformly light umber-brownish; or very light dull yellowish ochre at the base, passing distally into light brownish. Setæ light Vandyke-brown, with pitch-brown joinings. Fore legs rufo-piceous, the tarsi lighter; hinder legs either testaceous or dull translucent, almost raw-umber brown. Wings vitreous, with rufo-piceous neuration; the fore wing with a large round light raw-umber cloud in its apical third; its marginal area with 7 faint cross veinlets before the bulla and about 22 beyond it, many of which in the pterostigmatic space fork near the costa and anastomose with one another. Length of body 10, wing 10-11, setæ 30 & 6 mm.

Hab. St. Martin's Falls, Albany river, Hudson's Bay (Brit. Mus.); Rock Island, Ill. (Walsh).

(?) BLASTURUS VESPERTINUS, Lin.

Ephemera vespertina or [*Ephemera*], Lin., [Elandska Resa, p. 21 (1745); Fn. Suec. ed. i. 755 (1746); Syst. ed. x. i. 547 (1758); Fn. Suec. ed. ii. 378 (1761)]; *id.*, Syst. Nat. ed. xii. pars ii. 906 (1767); [De G., Mém. pour servir à l'hist. d. Ins. ii. pars ii. 646, pl. xvii. 11-16 (1771);] Zet., Ins. Lap. col. 1015 (1840); Westw., Introd. mod. classif. Ins. ii. fig. 61, no. 19, after De Geer (1840).

Subimago (dried).—Body and fore wings black; hind wings white. One of the smaller species of the family.

Hab. Plentiful at the river Sathaella, in Smoland. [Abstract from Linné.] De Geer's

whole-figure of the nymph is fairly characteristic of a *Blasturus*; but that of the detached gill (fig. 13) differs from the typical tracheal branchiæ of this genus in having the slender tail-points of the laminae in complete continuity with rest of the membrane. It is needless to detail references to Geoffroy, Fabricius, Berkenhout, Gmélén, Rossi, Schranck, Cederhjelm, Walckenaer, Latreille, and Stewart, who quote Linné's diagnosis. In 1871 I ranked *E. vespertina* with the typical species of *Leptophlebia*, citing as synonyms *Ephemerella albipennis*, Retz. no. 181 (1783), and *Baëtis fusca*, Burm., Handb. der Ent. Bd. ii. Abth. ii. 800 (1839). It was cited as a *Cloë* by Oulianine in 1867.

CHOROTERPES, Etn. 1881.

Illustrations. Adult (details), Pl. XII. 19; (whole figures) see Pictet, *Potamanthus marginatus*, op. cit. pl. 25 (1843-5). Nymph, Pl. XXXIV.

Adult.—Hind wing in front strongly and somewhat obtusely angulated nearly midway between the tip and the wing-roots, the angle, roughly speaking, forming the vertex of an obtuse triangle whose base is the radius (3); the exterior side of the triangle is not straight, presenting a shallow sinus about the extremity of the subcosta (2), followed by a very slight salient curve; its other side is somewhat rounded off at the wing-roots; the very gently curved subcosta lies rather nearer to the costa than to the radius, and terminates obliquely in the margin a little beyond the salient angle, in the vicinage of which the narrow marginal area is slightly dilated; the submarginal area is subtriangular, with the vertex obtuse; several cross veinlets occupy the distal $\frac{1}{3}$ of the former area, and a larger number the adjoining $\frac{2}{3}$ of the latter area. Cross veinlets plentiful towards the apex of the fore wing, but sparse elsewhere; next to none present in the marginal area before the bulla; in the hind wing they are fairly numerous. The nervures of both wings are devoid of branchlets at the terminal region, and there are no isolated veinlets there. The axillar nervures (9¹ and 9²) of the fore wing, strongly arched and mutually subparallel in the specimen figured, are often disposed in a manner similar to those of the wing represented in Pl. XIII. 20 *². The anal-axillar interspace of the fore wing contains four intercalary nervures, of which 1 and 3 are long, 2 and 4 short; they are commonly abrupt and linked together by few cross veinlets; very frequently intercalary 1 is connected with the anal by several cross veinlets, and occasionally intercalary 3 establishes direct communication with the first axillar; intercalars 2 and 4 sometimes remain isolated from the others. The guard is lacking at the orifice of the mesothoracic spiracle. Forceps-limbs of ♂ 4-jointed; joints 1, 3, and 4 short, the 2nd joint long, somewhat incurved, moderately compressed, and rather broadly dilated beneath at the base; forceps-basis short and stout, slightly emarginate in the middle; the corresponding ventral lobe of ♀ obtusely rounded and entire at its extremity. Median caudal seta subequal to the others; outer setæ of ♂ about $1\frac{1}{5}$ as long as the body. Tarsal unguis dissimilar each to the other. Fore tarsus of ♂ nearly as long as the tibia, which is about $1\frac{2}{3}$ as long as the femur; the joints in diminishing sequence rank 2, 3, 4, 5, and 1; hind tarsus (exclusive of joint 1) nearly $\frac{1}{4}$ as long as the tibia and joint 1 combined; its joints rank 5, 1-3 (subequal), and 4; joint 1 is fairly defined.

Nymph latent; abdominal tracheal branchiæ diversiform; those of segment 1 single, linear-lanceolate and minutely hairy; those of the other segments imbricate lengthwise at the sides of the dorsum, and formed of jugate, foliaceous lamellæ, oblique at the base and (speaking roughly) cuspidate at the extremity; in each twin the laminæ are unequal in size and rather dissimilar in form, the smaller being obliquely ovate, the larger obliquely subcordate-ovate, with one of the auricles large; the terminal cusp of both is effectively discontinuous with the major portion of the lamina (through the membrane on each side of its base being deeply incised) and is commonly turned upon its longer axis so as to lie in a plane at right angles with that of the other portion; the cusps are wider than those of *Blasturus*, for the most part, and less prolonged. Fangs of the mandibles abrupt; the brush of the endopodite tapers obliquely to a slender point. Palpus of maxilla 1 slender; joints 2 and 3, together, slightly longer than joint 1. Laciniaæ of the 2nd maxillæ rather broader, and the lobes of the labium smaller, than those of *Blasturus*. Tongue produced in the middle into an obtuse emarginate lobe, and prolonged on each side into a slender curved claw-like projection; paraglossæ acute laterally, rounded in front. Abdomen slender, the hinder lateral angles of the intermediate segments shortly and acutely produced. Caudal setæ about twice as long as the body. Hind leg a little the longest; the tarsus nearly $\frac{1}{3}$ as long as the tibia (the claw excluded).

Type. Ch. Picteti, Etn.

Distribution. Europe southwards of Belgium and Saxony; America (undescribed sp.), Arizona.

Etymology. χορός and τέρπω, delighting in the dance.

The figures of the tracheal branchiæ do not display the peculiar trending of the cusps of the laminæ, owing to their having been subjected to pressure, when drawn, in order to exhibit their outline. The species from Arizona is represented by two subimagines in Mr. M^oLachlan's collection. Identification of the nymph was accomplished by direct observation in the field.

CHOROTERPES PICTETI, Etn. Plate XII. 19 (wings, legs, forceps, and penis).

Potamanthus ‡ *marginatus*, Pict., Hist. Nat. Névropt. ii. Ephém. 208. pl. xxv. 4, 5 (1843-5); Walk., List of Neuropt. in Brit. Mus. part iii. 540 (1858); ? Oulianine, Neuropt. & Orthopt. of Prov. of Moscow, 27 (1867).

Leptophlebia Picteti, Etn., Trans. Ent. Soc. Lond. (1871), 87; ! *id.*, *op. cit.* (1873), 395; ! Rostock, Jahresh. d. Ver. f. Naturk. Zwickau, 1877, p. 84 (1878).

Habrophlebia Picteti, ! Etn., Ent. Mo. Mag. xvii. 196 (1881) [citation].

Choroterpes [type] *lusitanica*, ! *id.*, *op. cit.* xvi. 194 (Feb. 1881).—! *Ch. Picteti* (Etn. MS.), McLach., Compt.-rend. Soc. Ent. Belg. xxv. 135 (1881).

Subimago (living).—Wings uniformly purplish black. Legs and setæ dark piceous; tibiae and tarsi at first reddish piceous.

Imago (living), ♂.—Upper portion of eyes intense warm sepia-brown. Thorax jet-black above. Abdomen pitch-black, with pale rufescent joinings; penultimate ventral segment distinctly, and a few of the segments anterior to it faintly, tinged posteriorly with rufescent; forceps-limbs rufescent interiorly and distally; penis and setæ pitch-

black. Legs pitch-black; fore tarsus scarcely paler; hinder tibiæ and tarsi rufescent-piceous, the latter somewhat darker than the former. Wings vitreous with a somewhat talcose gloss; fore wing tinged with blackish (or in the dried insect, with fuscous) in the marginal and submarginal areas; neuration piceous, the costa somewhat testaceous at the base; cross veinlets numerous in the marginal area of the fore wing, numbering about 6 before the bulla and 16 beyond it; those in the pterostigmatic region anastomose irregularly with one another. Length of body 10; wing 10; setæ, ♂ im. 12, subim. 9 & 12 mm.

Hab. Widely distributed in Europe, ranging from Belgium and Heidelberg (M°Lach.), Dresden (Herr C. Schiller), and Switzerland (Pict.), to southern Italy^{Spain} and Portugal.^{p. 320} The nymph inhabits gently flowing shallow water, and attains maturity in summer and autumn.

THRAULUS, Etn. 1881.

Illustrations. *Adult* (details), Pl. XII. 20, and XIII. 20*, 2, 3. *Nymph*, Pl. XXXV.

Adult.—Hind wing strongly and obtusely angulated in front, the angle in normal species more nearly right-angled than in *Choroterpes*, placed almost in the middle of the fore margin, and followed directly by a well-defined sinus at the termination of the subcosta (2); marginal area oblong, truncate distally, and, after the great cross vein, of nearly uniform width; submarginal area trilateral, the radius (3) somewhat undulated in the typical species, the angles adjacent to it very acute, that subtended by it rather obtuse: in the marginal area, and in direct proximity to the salient angle, a single strong cross veinlet (or two at the most) communicates between the costa and the subcosta; in the submarginal area are 2 or 3 between the subcosta and the radius, seldom followed by a few others between the radius and the fore margin. Cross veinlets in the normal species numerous in the fore wing, excepting near the terminal and inner margins, which have no isolated veinlets; they are absent also from the marginal and submarginal areas before the bulla. The nervures of both wings in the typical species are generally branchless at the terminal margin; when any branchlets do occur, which is but seldom, they are very scanty, simple, and peculiar to the individual wing. [Deviations from the normal type of neuration are described below in the paragraph following the definition of the genus.] The anal-axillar interspace of the fore wing contains 2, 4, or 5 intercalary nervures, two of them long, the others short; when there are two only, they extend $\frac{2}{3}$ of the distance towards the wing-roots, and communicate by few cross veinlets with both of the nearest nervures; when 4 are present, the two shorter are placed as in *Choroterpes*, all communicate more or less both mutually and with the said nervures by cross veinlets, and all terminate abruptly; when there are 5, the fifth shares with another the interspace between the longest two. The orifice of the mesothoracic spiracle has valves only and lacks the guard. Forceps-limbs of ♂ 3-jointed; the proximal joint much longer than the remainder, and more or less dilated towards the base; the dilatation gradual in normal species. Forceps basis short, entire; homologous ventral lobe of ♀ obtusely rounded at its extremity. Caudal setæ 3, subequal in length to each other, mutilated in the typical specimens. Ungues in every tarsus dissimilar each to the

other; fore tarsus of ♂ subequal in length to the tibia, which is nearly twice as long as the femur; the joints in diminishing sequence rank 2, 3, 4, 5, and 1. Hind tarsus (including joint 1) nearly $\frac{1}{2}$ as long as the tibia; its joints rank 5, 2 subequal to 3, 1 and 4; the proximal joint is ill defined in dried examples. *Nymph* latent; abdominal tracheal branchiæ all bipartite; those of segment 1 with simple filiform divisions beset with short minute hairs; those of the other segments decumbent upon the sides of the dorsum, with simple oblong-ovate foliaceous divisions, fimbriate simply at the margins. Caudal setæ about as long as the body, similar to those of *Leptophlebia*. Mandibles, labium and second maxillæ, tongue and paraglossæ, very similar to those of *Choroterpes*; but the last are abrupt and emarginate, instead of acute, at the tips. Maxilla 1. also subsimilar to that of *Choroterpes*; but there is no spine below the subterminal series of pectinate setulæ on the lacinia, the palpus proportionally is rather shorter, and joints 2 and 3 together are subequal to 1 in length. Abdomen slender, slightly dilated at the sides; the hinder lateral angles of segments 8 and 9 shortly prolonged and acute. Hind leg rather the longest; the tarsus (claw excluded) about $\frac{1}{3}$ as long as the tibia.

Type. *Th. bellus*, Etn.

Distribution. Portugal; Central America (an undescribed sp.); also (provisionally referred species) Columbia and Lahat.

Etymology, θραῦλος, fragile.

The nymph of the typical species was identified, chiefly by inference from the local fauna of the stream where it was found, and partly by the structure of the genitalia of advanced specimens. The neuration of the fore wings of certain Central- and South-American species provisionally referred here (*Th. mexicanus* &c.) departs slightly from the type in the following particulars:—Cross veinlets are plentiful in proximity to the terminal margin, and the longitudinal nervures terminating in that margin are more frequently branched than in normal species. The intercalar nervures of the anal axillar interspace towards their anterior extremities curve forwards to unite each with the nervure next in advance, in the manner usual in species of *Atalophlebia*. Some of these species have cross veinlets before the bulla in the marginal area.

THRAULUS BELLUS, Etn. Plate XII. 20 (wings, legs, forceps, and penis). *Nymph*,
Plate XXXV.

Thraulus bellus, ! Etn., Ent. Mo. Mag. xvii. 195 (1881).

Subimago.—Wings light blackish grey.

Imago (living), ♂.—Eyes intense warm sepia-brown. Body blackish piceous; thorax jet-black above, with pale sutures. Legs piceous; the fore tarsi blackish, the hinder tibiæ and tarsi lighter. Wings vitreous, with light pitch-brown neuration; the marginal area of the fore wing contains about 12 well-defined and 3–4 very indistinct straight cross veinlets in the pterostigmatic region, but none before the bulla. Length of body, ♂ 8, ♀ 7 mm.

Hab. Portugal, in the stream below Cintra. The nymph was discovered at the end of April 1880. To find the imago, I revisited the locality on the 1st of June, early in the

morning (8–10 A.M.) before the sea-breeze arose. The only specimens of the adult and subimago obtained were struggling in a spider's web.

THRAULUS SIGNATUS, Hag.

Cloë signata, ! Hag., Verh. zool.-bot. Gesells. Wien, viii. 477 (1858), & ix. 206 (1859); [Gen. —?], Etn., Trans. Ent. Soc. London (1871), 131, note.

Leptophlebia (Etn.) *signata*, Hag., op. cit. (1873), 395.

Subimago (dried).—Wings talcose, transparent, dark sepia-grey, with concolorous neuration. Setæ of a like colour, with dark joinings. Thorax dull pitch-brown; legs of duller colour than those of the imago.

Imago (dried).—♂. Thorax polished, bright pitch-brown or rufo-piceous; dorsum of abdomen purplish sepia-brown; segments 2–6 translucent, paler at the base and sides, but opaque at the joinings, and blackish at the stigmata; venter subochraceous with darker joinings, excepting the ninth joint and the inwardly dilated base of the forceps, which are somewhat rubiginose; setæ light sepia-grey, with blackish joinings. Wings transparent colourless, iridescent; their longitudinal nervures translucent, very faintly tinged with pale brownish or amber colour, the wing-roots piceous; about 5 simple nearly straight cross veinlets in the pterostigmatic space of the fore wing. Fore legs lost; femora and tibiæ of the hinder legs the palest Vandyke-grey, the former banded in the middle and at its extremity with black, the tarsus and unguis faintly tinged with testaceous.

♀ very similar but darker; the ventral joinings of the abdomen more widely opaque; the pterostigmatic space of the fore wing sometimes contains 7 simple nearly straight cross veinlets. Length of body 5; wing, ♂ 6, ♀ 7; setæ, ♂ and ♀ im. about 6 mm.

Hab. Rainbodde, Ceylon, at altitudes of upwards of 4000 feet (Hag. Mus.). I do not think that the dilated portion of the base of the forceps is a separate joint.

With the types of *Thraulus signatus* stood single examples of two other species, perhaps of the same genus, from the same locality, numbered respectively 32 and 37.

Compared with *Thraulus signatus*, no. 32 presents the following differences:—none of the femora have a median black band, but only the terminal band; the dimensions of the insects in length of wing and body being the same, the legs of 32 are proportionally longer, and their colour generally is more flavescent; the wings have a stronger neuration, the longitudinal nervures are distinctly browner; in the pterostigmatic space are 10 simple and straight cross veinlets, of which the four nearest to the bulla are very faint.

No. 37 has the hinder legs uniformly pallid (fore legs lost), and 5 simple straight, or nearly straight, cross veinlets in the pterostigmatic space finer than those of *Th. signatus*.

THRAULUS EXIGUUS, sp. nov. Plate XIII. 20*² (forceps, penis, wings, and hinder foot).

Imago (dried), ♂.—Thorax above luteo-piceous. Abdomen discoloured, fuscous. Hinder legs whitish, with femora banded very broadly with black in the middle, the extremities of the femora and bases of the tibiæ also blackish, and the tarsi somewhat

amber-coloured or subtestaceous. Wings vitreous, with light pitch-brown nervures; the marginal area of the fore wing contains about 11 simple and straight cross veinlets in the pterostigmatic region, but none before the bulla. Length of body 6, wing 6.5 mm.

Hab. Lahat, Palembang, viii. 22. Communicated from Leyden by Mr. Ritsema.

THRAULUS MEXICANUS, sp. nov. Plate XIII. 23*⁴ (hind wing and genitalia).

Calliarcys (provisional) *mexicanus*, ! Etn., in the writing of the plate quoted.

Imago (dried), ♂.—Thorax fuscous above. Abdomen white, with segments 8–10 and the apical margins of segments 2–7 fuscous. Setæ white with black joinings. Fore wings vitreous; 10 slightly curved and mostly simple (rarely anastomosing near the costa) cross veinlets exclusively in the pterostigmatic portion of the marginal area of the fore wing. Length of body 6, wing 7, setæ 15 mm.

Hab. Mexico (Brussels Mus.). The neuration of the fore wing conforms to the type of the following species.

THRAULUS, sp. —. Plate XIII.*² (wings).

Calliarcys (provisional) *sp. —*, ! Etn., in the writing of the plate quoted

A nameless species represented by two ♀ subim. (M'Lach. Mus.), communicated by Messrs. Godman & Salvin, has well-defined cross veinlets in the marginal area of the fore wing both before and beyond the bulla.

Hab. Irazu, Costa Rica, at an altitude of 6000–7000 feet (H. Rogers).

THRAULUS LEPIDUS, sp. nov.

Imago (dried), ♂.—Thorax rich brown-ochreous above, changing in some lights to raw-umber brown. Abdominal segments 2–6 transparent whitish, each with the tip and an oblique stripe on each side recurrent therefrom, fuscescent; segments 7–10 rich brown-ochre, lighter or pale yellowish ochreous towards the sides and beneath, and narrowly edged with black at their distal dorsal border. Forceps light dull yellowish; the limbs inserted rather near to one another upon the basis, whose lower edge is only slightly prominent in the middle; the upper distal margin of the forceps-basis is prolonged into a prominent rounded lamina about half the length of the penis: penis hidden by dirt in the type specimen. Setæ white, with some of the joinings nearest the roots piceous, and others in the remainder of the seta black, viz. towards the base of the seta every alternate joining, about the middle of the seta every third joining, and beyond the middle of the same every fourth joining. Fore leg in opaque view, with the femur, tibia, and joints 3 and 4 of the tarsus pitch-brown, the remainder of the tarsus dull light yellowish ochreous, the tip of the tibia slightly tinged with pitch-black. Hinder legs in opaque view, with the femur light reddish brown or rufo-piceous, the tibia and tarsus opaque amber-yellowish. In transmitted light the dark portions of the legs are translucent rufo-piceous, the lighter portions translucent yellow-amber. Wings vitreous, their neuration and the submarginal area of the fore wing varying in colour with change of light from pitch-brown to raw-umber brown; the cross veinlets interjacent between the costa and the first half of the

pobrachial nervure, and the nearest to the wing-roots of those posterior to it in the fore wing, are slightly thickened ; the submarginal area of the same wing for a short space beyond the bulla is somewhat deficient in colour ; the said area contains about 4 cross veinlets before the bulla, and 14 beyond it, which are mostly straight and simple, only one or two of them forking near the costa. Length of body 7, wing 8, setæ 17 mm.

Hab. Chiriqui, Panama (M^cLach. Mus.). The neuration of the fore wing is of the same type as that of the wings represented in Pl. XIII. 23*² and 23*³.

THRAULUS COLOMBIÆ, Walk. Plate XIII. 20*³ (hind wing).

‡ *Ephemera colombiae*, ! Walk., List of Neuropt. in Brit. Mus. part iii. 537 (1853).

Palingenia colombiae, Hag. MS., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 304 [list].

Leptophlebia colombiae, ! Etn., Trans. Ent. Soc. London (1871), 84.

Adenophlebia colombiae, ! Etn., Ent. Mo. Mag. xvii. 194 (1881).

Subimago (dried), ♀.—Thorax very light brown-ochreous above. Abdomen light rufoluteous above; segments 1-8 bordered with black at the apical margin, segments 2-7 marked on each side with a broad black stripe descending obliquely from the distal border. Setæ intense warm sepia-brown, dark at the joinings and in the midst of the joints. Fore femur lutescent reddish-brown, almost light clove-brown, the tibia pitch-brown, the tarsus lighter or more lutescent than the tibia; hinder legs dull, subluteous or dark testaceous, the coxae and trochanters paler. Wings transparent light brown-ochreous-grey; in the fore wing, the longitudinal nervures, the cross veinlets in advance of the radius, and most of those posterior to it in the proximal half of the disk of the wing, are light brown-ochreous; the cross veinlets posterior to the radius in the remaining portion of the disk are black. In the marginal area of the fore wing are 1 or 2 very faint cross veinlets before the bulla, and beyond it 18-19 oblique, curved, and near the costa sparingly forked. Length of body, ♀, 10, wing 15, setæ 19 mm.

Hab. United States of Colombia (Brit. Mus.). The length of the setæ and habitat were misstated by me in 1871.

THRAULUS LÆTUS, sp. nov. Plate XIII. 23*³ (wing [part] genitalia and hinder foot).

Calliarcys (provisional) *lætus*, ! Etn., in the writing of the plate quoted.

Imago (dried), ♂.—Thorax rich brown-ochre above. Abdomen in segments 2-6 white, with a series of small triangular spots on each side of the dorsum, and with the spiracles black; segments 7-10, above fusco-rufescent, the 8th narrowly edged in the midst of its distal margin with light yellow ochre, the bordering enlarged abruptly on each side into a triangular spot, whose point reaches the base of segment 7; segments 9 and 10 have a small oblong yellow-ochreous spot on each side of the dorsum and a black dash at the lateral border. Beneath, segments 7-10 are light yellow-ochreous, with their lateral borders rufescent, the tips of the forceps also rufescent; ventral ganglia light warm sepia brown. Femora whitish, with a grey-black band before the middle and a very broad conspicuous rufescent band near the tip: tibiae and tarsi in some lights very pale pitch-brown, in other lights very pale lutescent, the former grey-black at the tip, and the

latter narrowly edged with grey-black at the joinings. Wings vitreous, their nervures in opaque view testaceous, changing in transmitted light to yellowish amber-colour, their membrane slightly fuscescent by the wing-roots and great cross vein; the marginal area of the fore wing contains about 9 simple curved cross veinlets, exclusively in the pterostigmatic region. Length of body 6, wing 8 mm.

Hab. New Granada (M^oLach. Mus.).

ADENOPHLEBIA, Etn., 1881.

Illustrations.—*Adult* (details), Plate XIII. 21.

Adult.—Hind wing obtusely and very strongly angulated in front; the angle placed at about the first $\frac{1}{3}$ of the wing's length, and followed by a wide sinus; the sinus, extended as far as the extremity of the radius (3) and close to the tip of the wing, is nearly straight-edged from the angle to the termination of the subcosta (2), where it attains its greatest depth, and from thence to the end of the radius its margin is very gently convex; marginal area obtusely subtriangular, with the angle at the extremity of the subcosta very acute; submarginal area much narrower than the preceding, elongated, irregularly quadrangular, acuminate at both ends, and with the hinder of the obtuse angles situated nearly midway between the wing-roots and the tip of the wing; the lines containing this angle [viz. the radius, and the common trunk of the radius and cubitus (5)] are gently arched; the marginal area contains 2–4 cross veinlets, the submarginal a few more; the nearest of those to the wing-roots is in immediate proximity to the salient angle of the front margin. Cross veinlets plentiful in the fore wing, excepting towards the inner margin; most of the nervures at the terminal margin have curved simple branchlets. The arrangements of the intercalar nervures of the anal axillar interspace of the fore wing cannot be described fully through lack of an adequate series of specimens; in the wing figured they are 4 in number, and (counting from front to rear) 1 and 3 are long, 2 and 3 annex themselves to 1, and this to the anal, 4 is isolated and short; sometimes 1 and 3 project abruptly a little in front of the cross veinlets adjacent to their terminations, while 4 is much abbreviated; cross veinlets continue to be plentiful as far as the first intercalary nervure, and then become scarce. Probably other combinations occur similar in general plan to those displayed in figs. 23*² and 23*³ of the same plate. Orifice of the mesothoracic spiracle furnished with a small oval guard. Forceps-limbs 2-jointed in the type; the proximal joint compressed, many times longer than the other, and in its basal half broadly dilated. Forceps-basis short and entire; the homologous ventral lobe of ♀ obtuse and entire. Median caudal seta subequal to the others; those in ♂ about twice as long as the body. Tarsal unguis uniformly narrow and hooked; fore tarsus of ♂ scarcely longer than the tibia, which is little longer than the femur; its joints in diminishing sequence rank 2, 3, 4, 5, and 1. Intermediate leg little more than half as long as the hind leg. Hind tarsus (excluding joint 1) about $\frac{1}{3}$ as long as the tibia and joint 1 together; its joints rank 2, 3 subequal to 5, 4; joint 1 is ill defined. *Nymph* unknown.

Type. *A. dislocans* (in *Ephemera*), Walker.

Distribution. South Africa.

Etymology. ἀδην and φλέβιον, from the abundance of cross veinlets in the wings.

ADENOPHLEBIA DISLOCANS, Walker. Plate XIII. 21 (wings, legs, forceps, and penis).

‡*Ephemera dislocans*, ! Walk., Trans. Ent. Soc. London, N.S. v. 198 (1860).

Leptophlebia dislocans [♀ im.], and *auriculata* [♂ im.], ! Etn., op. cit. (1871), 83, pl. iv. 24-24b [details].

Adenophlebia dislocans, ! Etn., Ent. Mo. Mag. xvii. 194 (1881).

Imago (dried).—♂. Thorax above black. Abdomen light pitch-brown, the dorsal joinings opaque, the darker colour produced obliquely downwards and forwards at the sides of the segments. Setæ in some lights pitch-black, changing to intense sepia-brown in others. Fore legs in opaque view either pitch-brown or rufo-piceous, in oblique view either very intense opaque raw-umber brown, or reddish brown, and in transmitted light either translucent dark brownish amber or rufescent amber; hinder legs rufo-piceous in opaque view; femora each with a dark submedian band, and with the extreme tip dark. Wings vitreous, the hind wings posterior to the subcosta (2) tinged with piceous-grey; neuration piceous, becoming blacker or browner when the posture is varied; cross veinlets strongly defined in the marginal and submarginal areas of the fore wing; in the former area are about 6 cross veinlets before and 10 beyond the bulla; those in the pterostigmatic region are simple and slightly curved.

♀. Thorax piceous above. Abdomen discoloured; the apical borders of the intermediate dorsal segments piceous or blackish, the dark colouring produced forwards into a pair of oblique triangular streaks on both sides of the back of each (viz. a streak at the postero-lateral angle, and another between that and the median line), so arranged that each streak of the inner series is continuous with a streak of the outer series in the antecedent segment. Setæ piceous at the base and intense sepia or warm sepia-brown towards their extremities. Femora luteo-piceous, banded nearly in the middle with black, and pitch-brown at the extremity; tibiæ and tarsi rufo-piceous. Wings vitreous, their neuration in opaque view piceous, in transmitted light browner; cross veinlets of the fore wing (excepting those adjacent to the terminal margin, and those in the extremity of the pterostigmatic space) bordered with Vandyke-brown or dark warm sepia-brown, which gives rise to small irregular spots in the midst of the wing between the base and the middle, and to rounded spots just behind the radius (3) and in some other situations; at the base of the costa a spot of a like colour occupies the space between the wing-roots and the cross veinlet nearest to the great cross vein: in the marginal area are about 7 cross veinlets before the bulla, and 15, mostly simple oblique and straight, beyond it. The cross veinlets of the hind wings are narrowly bordered, and the membrane distally is tinged with light reddish brown-grey. Length of body, ♂ 9; wing, ♂ 9, ♀ 6; setæ, ♂ 20, ♀ 18 mm.

Hab. Cape Colony, Graham's Town. As the hind wings of the ♀ (in Brit. Mus.) are exactly like those of the ♂ (in M^cLach. Mus.), I referred both to a single species in 1881. Sexual differences in the marking (and even the neuration) of the wings, are met with in some other *Ephemeridæ*, notably in *Cloeon dipterum* and (coloration only) in *Hagenulus*.

HAGENULUS, Etn., 1882.

Illustrations.—Adult (details). Plate XV. 21 bis.

Adult.—Hind wing angulated in front very strongly indeed, almost midway between the wing-roots and the tip; the angle, acuminate (and in the typical species prolonged more or less into a slender projection turned over sideways as a hook), precedes directly a very deep sinus which extends far beyond the termination of the radius, and attains its greatest depth in the interval between the subcosta (2) and the radius (3) at about $\frac{1}{3}$ of the shortest distance between the apex of the wing and the costa; marginal area subtriangular, with the angle at the extremity of the subcosta obtuse; submarginal area narrower than the preceding, somewhat obscure, but not quite rectilinear, the subcosta being strong and straight, the radius fine and subsinuous, and the margin between them concave; posterior to the radius two longitudinal nervures meet the margin, one a little before the obtuse apex, the other at the apex of the wing; cross veinlets limited almost to a single dislocated series extending transversely from the extremity of the subcosta to the middle of the inner margin, the marginal area containing none. In the fore wing cross veinlets are plentiful as far back as the second of the intercalaries in the anal-axillar interspace, and some of them at the terminal margin constitute simple branchlets to a few of the longitudinal nervures; the intercalary nervures in the interspace mentioned are 2 in number and long; the foremost (the longer) is prone to annex itself to the first axillar. Forceps-limbs of ♂ 3-jointed, with the proximal joint longer than the remainder, compressed and broadly dilated towards the base. Forceps-basis entire; the homologous ventral lobe of ♀ bifid and acutely excised. An egg-valve of extraordinary dimensions is produced from the apical border of segment 7, broad at the base, narrowed ellipsoidally from thence to the middle, and terminating in a spout or a tube split open along its upper side, resembling an ovipositor, projecting a little beyond the extremity of segment 10. Caudal setæ 3, subequal to one another, and in ♀ about twice as long as the body. Tarsal unguis all dissimilar each to the other; fore tarsus ♂ subequal in length to the tibia, which is more than twice as long as the femur; its joints in diminishing sequence rank 2, 3, 4, 5, and 1. Fore tarsus ♀ less than $\frac{1}{3}$ as long as the tibia, which is nearly $1\frac{1}{2}$ as long as the femur; hind tarsus ♀ (excluding joint 1) little more than $\frac{1}{5}$ as long as the tibia and joint 1 (which is ill defined) together; their joints rank 5, 2 subequal to 3, 1 and 4. *Nymph* unknown.

Type. *H. caligatus*, Hag. MS.

Distribution. Cuba.

Etymology. Dr. H. A. Hagen, the eminent neuropterist.

HAGENULUS CALIGATUS, Hag. MS. Plate XV. 21 bis (wings, legs, forceps, and penis).

Hagenulus (in *Potamanthus*, Hag.) *caligatus*, ! Hag. MS., Etn. Ent. Mo. Mag. xviii. 207 (1882, Feb.).

Subimago (dried), ♂.—Wings transparent light bistre-grey; neuration slightly opaque, most of the discal cross veinlets of the fore wing faintly bordered with greyish, some in the first three areas marked with black; 7 cross veinlets in the marginal area before the bulla. Setæ annulated with black.

Imago [*teste* Gundlach, has in life olive-brown oculi, and a light brown-ochreous body, with a small black or brown spot on each side of every abdominal segment, Hag. MS.], ♀ (*dried*). Thorax luteo-fuscous above; abdomen discoloured, the segments darker at the tips, the venter paler than the dorsum. Setæ white, or greyish white, with black bands and joinings, the bands being placed at every joint near the base of the seta, then at every alternate joint, and ultimately, still farther away from the base, at every third joint. Wings vitreous; the marginal area of the fore wing, slightly discoloured from the base to at least as far as the middle, contains about 7 simple cross veinlets before, and 11 beyond the ~~nodal point~~^{bulla}; neuration piceous, nearly every cross veinlet marked with a roundish blackened spot. Legs dull pale lutescent, each with two piceous bands on the femur, the tibia black at the tip, and the tarsus sublutescent [“with darker tip to the tarsus,” Gundlach, MS.]. Length of body 5-7·5, wing 7·5-8, setæ about 10 mm.

• *Hab.* Rangel Mountains, Cuba, in June (Hag. Mus.). Four ♀ imagines in the collection differ from the ♂ subim. above described in having 0 cross veinlets in the marginal area before, but 9 beyond, the bulla. Their wings are spotless, and their thorax, seemingly, is piceous above. They may represent another species.

HABROPHLEBIA, Etn., 1881.

Illustrations.—*Adult* (details), Pl. XIII. 22 *a*, *b*, & LXIV.² (whole figures); consult Pictet, *op. cit.* under *Potamanthus*, pls. 27 & 28 (1843-5). *Nymph*, Pl. XXXVI.; also Pictet, *loc. cit.*, and Vayssièr under *H. fusca* (1882) [who both omit the tracheal branchiæ of the first abdominal segment].

Adult.—Hind wing angulated strongly and rather obtusely in front, nearly midway between the wing-roots and the tip; the angle, almost right-angled, is followed abruptly by a strong sinus, the margin retiring perpendicularly from the vertex of the costal protuberance, usually to about halfway towards the subcosta, and thence following a semielliptical curve round the apex of the wing; the subcosta (2), arising in a gradual curve from the wing-roots, diverges from the common trunk of the radius (3) and cubitus (5), and then with diminished curvature, running subparallel with the radius, usually passes obliquely into the margin shortly before the tip of the wing; the radius terminates quite in the extremity of the wing; hence, distally, the marginal area is usually acuminately prolonged in proximity to the subcosta, and the submarginal is semi-parabolic; but sometimes, in individual examples of certain species, the hind wing conforms essentially to that of *Thraulus* (Pl. XII. 20), the subcosta meeting and terminating in the margin at the sinus, and the marginal area being correspondingly truncate distally. Cross veinlets variable in number and distribution in both wings; in small specimens they are commonly placed as in Pl. XIII. 22 *a*, not approaching the terminal margins of the wings, and amounting to a very limited number in the hind wing; in the ♀ fore wing they are sometimes well defined in the marginal area before the bulla, where in small specimens they are usually obsolescent; in large examples they are often nearly as numerous in both wings as in *Calliarcys* (Pl. XIV. 28), and then those forming branchlets to the longitudinal nervures at the terminal margin of the fore wing are somewhat deficient in regularity, and are usually curved. The anal-axillar interspace of the fore

wing contains from 2 to 5 intercalar nervures; when there are five, 1, 3, and 4 are abbreviated or obsolescent; when four are present, intercalar 3 is absent; when there are three, 1 is the short one: intercalars 2 and 5 are constant, they communicate by cross veinlets with each other, and usually with the anal (seldom the first axillar) nervure, and either of them may terminate abruptly or else (combining intimately with a cross veinlet) may bend suddenly aside to join an adjacent nervure; for example, intercalar 5 may be isolated, or may bend suddenly aside to intercalar 2 or to the anal; and intercalar 2 may be abrupt and communicate by cross veinlets with the anal nervure alone, or may bend suddenly aside to join either the anal or intercalar 5. Orifice of the mesothoracic spiracle usually closed in the dead insect; when open, the aperture is small, gaping in front, and without a guard. Forceps-limbs of ♂ 3-jointed, the proximal joint shorter than the others combined, and suddenly dilated or tuberculated on the inner side of the base; the second and third joints rather long, and like those of a finger. Forceps-basis bifid, narrowly or acutely excised in the middle; the homologous lobe of ♀ also bifid and acutely excised. Caudal setæ in both sexes 3, mutually subequal, and thrice as long as the body. Ungues in every tarsus dissimilar each to the other; fore tarsus in ♂ little longer than the tibia, which is nearly $\frac{1}{3}$ longer than the femur; its joints in diminishing order rank 2 subequal to 3; 4, 5, and 1. Hind tarsus about $\frac{1}{4}$ as long as the tibia; its joints rank 5, 2, 3, and 4; 1 is ill defined; hind leg not much longer than the intermediate leg. Fore tarsus ♀ (exclusive of joint 1) about $\frac{3}{8}$ as long as the tibia and joint 1 combined, which are about $1\frac{1}{4}$ as long as the femur; its joints rank as in the ♂ hind tarsus; 1 is indistinctly defined. *Nymph* latent in places where the current of shallow streams is gentle, or where the ripple from rapids is greatly diminished amongst stones at the brink. Abdominal tracheal branchiæ nearly uniform in shape, bifid, with the divisions filiformly dissected, and each with fewer segments in the upper division than in the lower; when extended they slant backwards and outwards, with the smaller divisions ascending; their segments vary in number with the age of the nymph, and are most numerous in the intermediate pairs; their surface is sparsely beset with minute hairs. Mandibles, labium, and maxillæ II. very similar to those of *Blasturus*; maxillæ I. nearly as in *Thraulus*. Tongue obcordate-oblong; paraglossæ narrow, curved, oblique and acuminate laterally, with a slight indentation in the margin a little before the point. Body slender; antennæ of moderate length; posterior lateral angles of segments 8 and 9 of the abdomen shortly and acutely produced; caudal setæ about $\frac{5}{6}$ as long as the body, and beset with minute spreading hairs at the joinings. Hind leg about as long as the fore leg; the tarsus (claw excluded) almost $\frac{1}{2}$ as long as the tibia.

Type. *H. fusca* (in *Ephemera*), Curt.

Distribution. Europe, temperate and southern; N. America, New Hampshire (undescribed sp.).

Etymology. ἀβρός and φλέβιον, in reference to the prevailing delicacy of the cross veinlets of the wings.

The figures in Pl. XIII. of this volume do not display the mutual dissimilarity of the tarsal unguis; they were drawn from dried specimens. This feature of the unguis was stated correctly in Trans. Ent. Soc. London (1871), p. 90, but not in Ent. Mo. Mag.

(1881), p. 195. I have seen living nymphs of *H. fusca* and *lauta*, besides other species in Portugal and Italy.

Owing to the colours being transparent, those of the legs, wing-nervures, &c., are liable to vary greatly with the direction in which they are viewed; and as the species of this genus are in a large measure distinguishable from each other by slight differences in the colouring of these parts, it is well to state what is the position of the specimen when such and such colours appear. The following terms are employed for this purpose:—*opaque view*, when the examiner standing back to light holds the specimen directly away from the light; *oblique view* or *reflection*, when the object held towards a dark back-ground is examined under an oblique light, the examiner either facing the light with the specimen below the eye, or standing sideways to the light with the object nearly on a level with the eye; in *transmitted light* the insect is interposed between the eye and the window.

HABROPHLEBIA FUSCA, Curtis. Plate XIII. 22 a (wings, ♂ legs, forceps, and penis).

Ephemera fusca, Curt., Lond. & Edinb. Phil. Mag. ser. 3 (1834), 120.—*E. minor*, ! Steph., Ill. Brit. Ent. vi. 60 (1835).

† *Baëtis cingulata*, ! Steph., op. cit. vi. 67 (1835).

Potamanthus brunneus, Pict., Hist. Nat. Névropt. ii. Ephém. 217, pl. xxvii. (1843–5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 542 (1853).—*P. fuscus*, Pict., Hist. &c. 235 (1843–5); Walk., List &c. 543 (1853); Hag., Ent. Ann. (1863), 19.—*P. minor*, Pict., Hist. &c. 237 (1843–5); Walk., List &c. 546 (1853).

Cloë cingulata, Pict., Hist. &c. 271 (1843–5).

Cloeon cingulata, Walk., List &c. 578 (1853).

Leptophlebia fusca, ! Etn., Ent. Mo. Mag. v. 87 (1868); *id.*, Trans. Ent. Soc. London (1871), 90, pls. ii. 2 c, v. 2–2 b [details]; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 318 (1874); ! Vayssièvre, Ann. des Sc. Nat. (6), Zool. xiii., pl. i. 1, 2 (1882).

Habrophlebia [type] *fusca*, ! Etn., Ent. Mo. Mag. xvii. 196 (1881) [citation].

Subimago (living).—Wings light blackish grey, the nervures, at first opaque whitish, becoming tinged with pitch-brown. Thorax pitch-brown, with pale sutures. Fore femur dull pitch-brown or pitch-black; tibia and tarsus in opaque view blackish grey, changing in some lights to warm sepia-grey. Hind femora dull light greenish Vandyke-grey or greenish sepia-grey, tibiæ light sepia-grey, tarsi light blackish grey. Setæ light warm sepia-grey, the joinings slightly opaque. Upper portion of eyes dull reddish-brown, polished; lower part intense sepia-black.

Imago (living).—♂. Upper portion of oculi intense burnt-umber brown, the lower blackish. Thorax jet-black or pitch-black above, with light reddish-brown tegulæ. Abdomen pitch-brown, growing darker with age; segments 2–7 translucent, excepting at the joinings, and narrowly whitish at the base; the remaining segments opaque, the extreme distal edges of 7–9 often orange or light yellow above; venter dark sepia-grey or blackish grey, often modified to some extent in segments 8 and 9 with dull orange. Setæ light sepia-grey, with light brownish joinings. Last two joints of the forceps-limbs light sepia-grey; penis during life somewhat Y-shaped, with slender recumbent spurs beneath the lobes. Fore femur and both ends of the tibia pitch-black, the intermediate

portion of the latter pitch-brown, the tarsus lighter, varying with change of posture to brownish-black-grey : [when dried, in oblique view the tibia reflects a light madder-brown, or (in specimens from Biron) a light Venetian-red, and the tarsus is light testaceous ; in transmitted light the former becomes translucent rufo-piceous or amber-brown, and the tarsus yellowish amber.] Hinder legs (*dried*) translucent amber-brown in transmitted light, changing in opaque view to a nearly uniform light pitch-brown, and in oblique view to a light translucent bronze or bistre-brown, the tarsi in certain positions appearing light greyish, with opaque edges to the intermediate joints, but usually concolorous with the tibiae. Wings vitreous ; the longitudinal nervures and the cross veinlets of the pterostigmatic region of the fore wing in opaque view pitch-brown, in oblique view light brownish ; in transmitted light the stronger nervures become yellowish amber, and the finer whitish. The marginal area of the fore wing contains about 4 obsolescent cross veinlets before the bulla, and beyond that 11 ; of these, 4-8 in the pterostigmatic region are well defined, simple, and slightly curved ; the remaining cross veinlets of the wing are more delicate, and are deficient in colouring, excepting sometimes those in the distal half of the submarginal area.

♀ similar generally to ♂, with the fore tarsus lighter, and the setæ with darker joinings. In the fore wing the neuration, on the whole, in a slight but appreciable degree is better defined than in the ♂, and the cross veinlets in the outer half of the wing situated between the radius (3) and the *præbrachial* (6) nervures exhibit the same colours as those in the pterostigmatic region. Length of body 5-7 ; wing 6-7 ; setæ, ♂ im. 8 & 12-11 & 12, ♀ 6 & 8-8 & 9, subim. 5.5 & 7 millim.

Hab. Generally common in Western Europe during the summer months, frequenting brooks and rivers of moderate temperature, and ranging from Great Britain and the Vosges (M^oLach.) southwards to the lowlands of Switzerland and southern France. Specimens from this last district (where I have met with it in the neighbourhood of Toulouse and abundantly at Biron near Orthéz) have the wings of the subimago more of a sepia-grey than a black-grey, and the legs of the ♂ imago rather brighter in tint than those of normal examples ; the thorax also of a ♀ im. from Toulouse, in my collection, is pitch-brown instead of pitch-black ; but this ♀ may have been prematurely killed, and the differences in colouring of the ♂ im. and the subim., mentioned, are not sufficiently marked to be accounted specific.

HABROPHLEBIA NERVULOSA, sp. nov.

Subimago (dried).—Wings sepia-grey, with pitch-brown neuration. Setæ warm sepia-grey, with opaque joinings.

Imago (living and dried).—Difficult to distinguish from *H. fusca* without actual comparison of specimens ; chiefly characterized by the cross veinlets of the wings being usually more strongly defined than in that species, and by the hinder femora being dark at the tip in opaque view.—♂. Upper portion of eyes castaneo-piceous, the lower sub-piceous. Thorax jet-black above, sometimes dark piceous when dried. Abdomen dark piceous above, with the apical margins of the segments narrowly yellowish, and with the bases of segments 4-7 in some examples partially translucent ; venter slightly paler and

duller. Setæ either piceous, or with their bases piceous and their remainder whitish warm sepia, with the joinings alternately broadly and narrowly piceous. Forceps piceous at the base, with their last two joints smoky grey. Fore legs (*during life*) pitch-black, with brownish-black tarsi, these changing in some lights to smoky grey; hinder legs piceous, with the tips of the femora dark, the tarsi blackish grey, and the tibiæ in some lights smoky grey, excepting towards both of their extremities. *When dried*, the fore legs become dark piceous in opaque view, changing in oblique view to intense pitch-brown, with the tarsus lighter brownish or almost light burnt-umber brown; and viewed with light transmitted the femur is dark piceous amber, the tibia less opaque, and the tarsus testaceous amber. The hinder legs, *when dried*, are raw-umber brown, with the tips of the femora dark, changing in transmitted light to translucent yellowish amber, with the tips opaque. Wings vitreous, with pitch-brown neuration; cross veinlets generally well defined, excepting in the marginal area of the fore wing before the pterostigmatic region, in the submarginal area before the bulla, and in the adjacent portion of the following area; but some of the lowland specimens have those in the remaining portions of the fore wing scarcely stronger than the weaker cross veinlets of the average wing. The marginal area of the fore wing contains about 4-6 ill-defined or obsolescent cross veinlets before the bulla, 3-4 beyond it, also obsolescent between that and the pterostigmatic space, while this contains 7-12 well-defined simple straight or slightly curved cross veinlets.

♀ (*dried*).—Thorax pitch-brown above. Wings transparent, with a slight brownish-grey tint, and with the neuration more strongly defined than in the ♂. In one of the specimens all of the cross veinlets of the fore wing are very distinct; in other specimens those corresponding in position with such as are obsolescent in the ♂ are weaker than the remainder: the marginal area contains about 5-6 before the bulla, and 14-17 beyond it, which are nearly all simple. Length of body 7-8; wing 7-9; setæ, ♂ im. 8 & 8·5-9·5 & 10·5, ♀ 8 & 9·5 millim.

Hab. Common in Algarve and Portugal, in May and June; ranging from altitudes of 200-400 ft. near Silves, up to 2000-2850 ft. on Foia in the former, and in the latter from 380-1280 ft. at Cintra and 640 ft. at Ponte de Morcellos, up to 1800 ft. in the Estrella, and 1600-2500 ft. near Villa Real in Traz-os-Montes.

HABROPHLEBIA MODESTA, Hagen. Plate XIII. 22 b (penis, two views).

Potamanthus modestus, ! Hag., Ann. Soc. Ent. Fr. sér. 4, iv. 39 (1864).

Leptophlebia modesta, ! Etn., Trans. Ent. Soc. London (1871), 91, pl. v. 3-3 b [details].

Subimago (dried).—Fore wings sepia-grey, lighter than those of *H. nervulosa*, with opaque neuration; hind wings dull pale yellowish grey. Setæ light warm sepia-brown, with opaque joinings.

Imago (dried); ♂.—Very similar to *H. nervulosa*, but larger; not so distinctly pale at the joinings of the abdominal segments, but on the contrary uniformly dark above, in the majority of specimens. Legs nearly of the same colours as those of *H. nervulosa*, but in most lights the fore tarsus appears concolorous with the remainder of the leg:

again, the hinder femora are just perceptibly lighter in tint than those of the species referred to, and the dark colour at their extremities is more narrowly restricted to the knee. In transmitted light the legs of *H. modesta* appear more translucent than those of *H. nervulosa*. In the marginal area of the fore wing (counting along the subcosta) are 4–6 obsolescent cross veinlets before the nodus, and beyond that 3–4 obsolescent followed by 11–16 well defined in the pterostigmatic region; of these last many are simple and straight or curved, but in many specimens some amount of irregularity is noticeable in the veinlets of the widest part of that region, some of them forking near the costa, and a few anastomosing with each other. ♀ very similar, according to Dr. Hagen, with brown eggs. Length of body, ♂ 6–7, ♀ 9; wings, ♂ 8, ♀ 9 millim.

Hab. Corsica (Hagen); Carinthia (Zeller, in M^oLach. Mus.). The above diagnosis is founded upon Carinthian specimens, captured in June.

HABROPHLEBIA UMBRATILIS, sp. nov.

Subimago (dried).—Wings light blackish grey, with opaque neuration.

Imago, ♂.—Upper portion of oculi reddish during life.—(*Dried.*) Thorax piceous, appearing pitch-brown or pitch-black according to the direction and the amount of light in which it is viewed. Abdomen above pitch-brown, with segments 2–7 to a slight extent translucent towards their bases, the pleural margins sometimes remaining dark throughout; the same segments beneath are more extensively translucent, with their joinings pitch-brown and their ganglionic cord subtestaceous, their general colour during life being probably greyer than that of the dorsum. Setæ greyish white or warm sepia-grey, with their alternate joinings warm sepia-brown. Basis and proximal joints of the forceps concolorous with the venter; the remaining joints greyish white. Penis translucent yellowish white, with well-developed reclinate slender spurs beneath. Fore femur and tibia in opaque view pitch-black, the latter darker at the tip, the tarsus testaceous; the femur reflects pitch-brown, the tibia a browner tint than the very light testaceous tarsus; in transmitted light the femur becomes warm translucent pitch-brown, the tibia light brown-ochreous amber, with its extremity somewhat opaque, the tarsus whitish yellow-amber. Hinder legs of lighter colour; the trochanter yellowish white; in opaque view the femora appear bistre-brown or piceous-grey, more opaque towards their distal extremities than elsewhere, and the remainder of the legs dull light brownish testaceous; the femora reflect a translucent light piceous-grey, darker distally, and the remainder of the legs a uniform dull brownish white, of nearly equal depth with the colour of the femora; in transmitted light the whole of the leg is translucent whitish brown amber. Wings vitreous; in the fore wing the longitudinal neuration, the cross veinlets of the pterostigmatic region of the marginal area, and the adjoining cross veinlets of the adjacent area, viewed against an opaque background, appear either bistre-brown or whitish, according to the direction in which the light falls upon them, the former colour persisting longest (during the change of posture) in the cross veinlets specified, the radius, subcosta, and in the distal half of the costa, whilst the remaining cross veinlets are transparent; in transmitted light, a slight yellowish-amber tint is perceptible in the radius, subcosta, and the great cross vein; the marginal area contains about 3 almost

imperceptible traces of cross veinlets before the bulla, and beyond that 6–7 well-defined, simple, nearly straight cross veinlets.

♀ differs from ♂ in the usual manner. Fore leg piceous, the tarsus whitish, with the apical edges of the intermediate joints narrowly darkened; in some lights the tibia as well as the tarsus appears brownish white. Wings tinted almost imperceptibly with greyish; their neuration more distinctly bistre-brown than in the ♂; in the disk of the fore wing, between the costa and the upper branch of the præbrachial (6) nervures, the cross veinlets are well defined; the marginal area contains about 3 almost effaced cross veinlets before the bulla, and beyond that 9, usually all simple and slightly curved. Length of body 5–5·5; wing, ♂ 5, ♀ 6–7; setæ, ♂ im. 8 millim.

Hab. Common at the end of July and beginning of August in the Appennino Pistoiese, near San Marcello, at altitudes of 2100–2700 ft. During the afternoon, the flies throng together along the borders of streams in the shade of alders (*Alnus*): hence the name. They are obtainable at other times by beating. The nymphs abounded under suitable stones in the grounds of the Villa Margherita. A ♂ im., captured at an altitude of 4400 ft., near Abetone, has the brownish colour of the hinder legs well marked.

HABROPHLEBIA MESOLEUCA, Brauer.

Potamanthus mesoleucus, ! Brauer, Neuropt. Austr. 74 bis (1857).

Leptophlebia mesoleuca, ! Etn., Trans. Ent. Soc. London (1873), 397; Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 84 (1878).

Imago (dried), ♂.—Thorax jet-black above. Abdomen in segments 2–7 pellucid white, the remainder reddish brown above. Setæ white [with darker joinings]; forceps white; penis spurred beneath, the spurs rather longer than the lobes, reclinate and slender. Fore legs greyish white; hinder legs white, pellucid [their femora tinged with fuscous]. Wings vitreous; subcosta and radius of the fore wing subpiceous; cross veinlets of the pterostigmal region curved and mostly simple. Length of body 5, wing 6; setæ, ♂ im. 7 millim.

Hab. Austria, marshy places in the Prater, near Vienna, in June, and in Styria (Brauer); Saxony, very common near Dretschen (Rostock). The foregoing is based upon Dr. Brauer's description, supplemented by original notes made in 1873 of a specimen named by Rostock, and forwarded for inspection by Mr. Albarda. The darker fore femora of *H. lauta* enable it to be separated at a glance from the present species.

HABROPHLEBIA LAUTA (renamed).

Potamanthus ♀ *cinctus*, Pict., Hist. Nat. Névropt. ii. Ephém. 219, pl. xxviii. 1–6 (1843–5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 543 (1853).

Habrophlebia lauta, ! M'Lach., Rev. d'Ent. iii. 19 (1884) [undescribed].

Subimago (dried).—Wings whitish sepia-grey, with concolorous neuration.

Imago (living), ♂.—Upper eyes flesh-red [this colour modified in some examples with testaceous], lower eyes black. Thorax jet-black above, varied with a lighter colour at the sides. Abdomen, from segment 2 to the base of segment 7, pellucid white, with the tips of the segments sometimes tinged very faintly with light reddish; the remaining segments subpiceous above, modified beneath more or less, from segment 8 to the tip,

with rusty yellow or dull orange. Setæ and forceps white; penis pitch-brown, changing to testaceous when dried. Fore leg, with the trochanter, femur, and both extremities of the tibia piceous, and the remainder white; hinder legs white, with the tarsus, the extreme base of the tibia, and the extremity of the femur very light dull amber-colour or greyish. Wings vitreous, with pellucid neuration; marginal area of the fore wing with 4-6 hardly perceptible traces of cross veinlets before the nodus and 3-4 beyond it, followed in the pterostigmatic region by 7-10 that are well defined, simple, and almost straight.

♀ (*living*).—Thorax fusco-piceous above. Dorsum of abdomen piceo-fuscous; venter lighter; setæ white. The stronger of the longitudinal nervures of the fore wing are faintly tinged with olive-grey. Length of body 5-6; wing 6·5-7; setæ, im. ♂ 9 & 8-11 & 10, ♀ 6·5-7 millim.

Hab. France, at and near Pau (under 600 ft.), June; common in the Vosges, and at Bouillon, Belgium (M°Lach.), July. Switzerland, Münchenbuchsee, Canton Berne, and the stream at Versoix, near Lake Leman, August; near Troinex under Mt. Salève near Geneva (over 1300 ft.), September. Some remarks concerning this species are given above under *Leptophlebia cincta*.

CALLIARCY'S, Etn. 1881.

Illustrations. Adult (details), Pls. XIV. 23 (typical). [N.B. Pl. XIII. 23*, 2, 3 (provisional), are referred to *Thraulus*.]

Adult.—Hind wing very similar to that of species of *Habrophlebia*, with plenty of cross veinlets and a comparatively narrow form. Cross veinlets numerous in the fore wing, excepting near the inner margin; those in the marginal area before the bulla distinct; some at the terminal margin (which has no isolated veinlets) occasionally constitute here and there simple curved branchlets to longitudinal nervures in individual wings. In the typical specimens, the intercalary nervures of the anal-axillar interspace of the fore wing establish communication with the anal (8) nervure; they are four in number (not counting as one an occasional simple branchlet of the anal nervure), and 3 and 4 are long, 1 and 2 short; intercalars 1, 2, or 3 may terminate abruptly; 1 may be shorter than 2, may curve towards 2 instead of towards the anal, and may be linked by a series of cross veinlets to 3, 2, and the anal; when 3 is abrupt, it is similarly linked to the anal. Aperture of the mesothoracic spiracle without a guard. Forceps-limbs of ♂ 3-jointed; the proximal joint much longer than the remainder, and gradually dilated towards the base. Forceps-basis excised in the middle; the homologous ventral lobe of ♀ bifid and acutely excised. Median caudal seta subequal to the others; those of ♂ nearly $1\frac{1}{2}$ as long as the body. Ungues in every tarsus each unlike the other; fore tarsus of ♂ about $1\frac{1}{4}$ as long as the tibia, which is about $1\frac{1}{5}$ as long as the femur; its joints, in diminishing sequence, rank 2 and 3 subequal, 4, 5, 1; hind tarsus little more than $\frac{1}{3}$ as long as the tibia combined with joint 1, which is ill defined; its joints rank 5, 2, 3, 4. Fore tarsus of ♀ little more than $\frac{1}{2}$ as long as the tibia, which is little longer than the femur; its joints rank 2, 5, 3 subequal to 4, and 1 fairly defined [the proximal joining is too strongly defined in the whole-figure of this leg]. *Nymph* unknown.

Type. *C. humilis*, Etn.

*Spain,**Distribution.* Algarve and Portugal.*Etymology.* καλός and ἄρκυς, from the completeness of the reticulation of the wings.

Upon reconsideration, I am disposed to transfer to *Thraulus*, provisionally, the species referred provisionally to the present genus in the writing of Pl. XIII., because the relative lengths of the intercalary nervures of the axilar-anal interspace of their fore wings correspond more nearly with those of the typical *Thraulus* than with those of the typical *Calliarcys*, and also because their ♂ forceps-bases are entire. The oblique acuminate prolongation of the marginal areas of the hind wings of these species led, doubtless, to their being classed otherwise in the first instance. It is extremely probable that they constitute a genus of their own; but the materials at hand do not suffice for its definition.

CALLIARCY'S HUMILIS, Etn. Plate XIV. 23 (wings, legs, and genitalia).

Calliarcys humilis, ! Etn., Ent. Mo. Mag. xviii. 21 (June 1881).

Subimago (dried).—Wings ivory-black grey. p. 320

Imago (dried), ♂.—Thorax jet-black above. Abdomen pitch-brown, with joinings 2–6 narrowly pale. Setæ light warm sepia, with piceous or reddish joinings. Forceps in opaque view light pitch-brown, changing in transmitted light to translucent bistre-brown; the divisions of the forceps-basis singularly prolonged at the points. Fore legs in opaque view piceous, in oblique view reflecting rufo-piceous, and in transmitted light translucent golden-brown amber (like resin or treacle); hinder legs somewhat lighter. Wings transparent, with light pitch-brown neuration, changing to brownish amber in transmitted light; the membrane is tinted perceptibly with a similar but faint light-brownish grey: in the marginal area of the fore wing are 6–7 cross veinlets before the bulla, and 13–18 almost always simple and slightly curved beyond it, all well defined. Length of body, ♂ ♀ 7–9; wing, ♂ 7–8·5, ♀ 9; setæ, ♂ im. 10–11·5 millim.

Hab. Algarve, on the northern slopes of Foia near Monchique, at altitudes of little over 2000 ft. (e.g. common near the waterfall at the foot of the final slope, at about 2150 ft.), at the end of May; also in Portugal, in the Estrella, on a hill south of Sabugueiro, at an altitude of about 4100 ft., early in June; in streams having a temperature at that season of 56° Fahrenheit. p. 320

Section 6 of the Genera.—Type of *Ephemerella*. *Adult.*—Pronotum of ♀ traversed lengthwise by a raised median line or ridge; its posterior border arched, and either truncate or slightly depressed in the middle. Hind tibia rather shorter than the femur; the tarsus about $\frac{2}{3}$ as long as the tibia. In the fore wing the anal (8) and first axillar (9¹) nervures are connivent and mutually contiguous at the wing-roots, apart from the second axillar (9²) and pobrazial (7) nervures. Penis-lobes distinct; orifices of the seminal ducts terminal; no stimuli apparent. *Nymph* [*Teloganodes* unknown]. Terminal margins of the fore wings connected with the peak of the mesonotum, each by a distinct triangular membrane. Palpus of the 1st maxilla (when present) shorter than the lacinia, which is crowned with a sparse tuft of hair and armed with spinules along its inner edge. Lobes of the labium small, rounded, and subequal to the laciñæ of the 2nd maxillæ. Abdominal tracheal branchiæ fewer than the maximum number in the Family, being absent from the

2nd segment and usually from the first as well; when they exist on segment 1 they are minute, erect, hirsute, and filiform, unlike the others; these, issuing from the posterior margins of the segments at the bases of the pleuræ, are recumbent upon the sides of the dorsum and either imbricated or stratified, and are formed each of a broad parchmentose lamina (or a membranous lamina, if the branchia be wholly obtruded), concave on the underside, covering and in some extent coherent with a forked appendage, the support of membranous lamellæ, which are numerous and closely imbricated in the large branchiae, but very scanty in the small. Many of the pleuræ are dilated so as to form acute serratures at the sides of the abdomen, and their edges, like some other parts of the body (*e. g.* the femora or setæ), are beset with remarkable hairs, which commonly resemble in their structure the peculiar hairs of certain *Trombidiid Acarina* in being filiform or clavate, and in many instances microscopically velutinous or otherwise roughened. Natation laboured, aided by movements of the legs.

The genera of this section display affinity with the type of *Cænis* in the particulars detailed in the last sentence but one of the foregoing paragraph.

North America has yielded several nameless nymphs referable to this section, whose ultimate development needs investigation. Their characteristic differences chiefly reside in the arrangement and form of the tracheal branchiæ, the length of the palpus of the 1st maxilla (when present) and the proportions of its component joints, and in the form of the body—tabulated hereunder. The indications of wing-neuration delineated in their figures are largely conventional. Being for the most part very nearly akin to *Ephemerella*, their detailed descriptions are inserted immediately after the descriptive letterpress of the species of this genus, preceding the description of the Cingalese genus *Teloganodes*, whose nymph is unknown. Those are the only two genera in the section that are named.

TABULATION OF NYMPHS RANKED IN SECTION 6 OF THE GENERA.

Nos. 3–7 of the abdominal segments bear tracheal branchiæ; of these, the first four on each side of the dorsum are loosely imbricate. Antennæ inserted

upon the disk of the frons. Terminal joint of the palpus of maxilla 1.

subequal to the remainder; joint 2 longer than joint 1. Caudal setæ narrowly plumose. Branchial laminæ oblique, oblong or ovate oblong

Pl. XXXVII. *Ephemerella*.

scarcely $\frac{1}{2}$ as long as the remainder; joint 2 subequal to joint 1.

Branchial laminæ somewhat obovate.....

Pl. XXXVIII. 1–10.

scarcely $\frac{1}{3}$ as long as the remainder; joint 2 about $\frac{4}{7}$ as long as joint 1. Branchial laminæ subrotund

Pl. XXXVIII. 11–15.

in re-entering angles at the front lateral margins of the frons. Terminal joint of the palpus of maxilla 1. about $\frac{1}{5}$ as long as the remainder; joint 2 about $\frac{2}{3}$ as long as joint 1. Branchial laminæ somewhat oblong and slightly oblique. Ventral surface of the body singularly adapted for adhesion to smooth surfaces.....

Pl. XXXIX.

Nos. 4–7 of the abdominal segments bear tracheal branchiæ; the laminæ, irregularly subovate, are compactly imbricate. Caudal setæ plumose.

- Antennæ inserted upon the disk of the frons. Terminal joint of the palpus of maxilla 1. about $\frac{2}{3}$ as long as the remainder; joint 2 less than $\frac{1}{2}$ as long as joint 1 Pl. XL. 1-17.
- Nos. 1 and 4-7 of the abdominal segments bear tracheal branchiæ; the first is subulate and erect; the others are of normal structure, their laminæ ovate-oblong and compactly stratified; the laminæ of those of segment 4 are each traversed by a slight furrow from side to side beyond their middle, serving as a hinge. Caudal setæ plumose. Antennæ inserted upon the disk of the frons. Palpus of maxilla 1. lost [or aborted?] Pls. XL. 18-20 & LXIV. 3-8.

EPHEMERELLA, Walsh, 1862.

Illustrations. *Adult* (details), Pl. XIV. 24 *a-c* [wings, legs, ♂ head and genitalia]; Etn., Trans. Ent. Soc. London (1871), pl. ii. 5 [part of fore wing]:—(whole figures) see under *E. ignita*, synonyms *Potamanthus*, Pictet, *op. cit.* pls. 30, 31, & 33. *Nymph*, Pl. XXXVII. ; also Pictet, *op. cit.* pls. 29 & 33, and Vayssiére, Ann. des Sc. Nat. (6) xiii. pl. viii. 74 &c. (1882).

Adult.—Hind wing of moderate size, unevenly arcuate in front, with a very shallow marginal depression just beyond the most salient portion of the costa; the subcosta (2) advancing from the wing-roots in a bold curve towards that prominence, proceeds, in proximity to the costa from thereabouts, almost in a direct course towards the obtuse extremity of the wing, and meets the margin obliquely rather near the termination of the radius (3); this last nervure, more gently curved, approaches the subcosta gradually, and attains the tip of the wing: the intercalar neuration is well developed, and cross veinlets are numerous. In both wings most of the intercalary veinlets remain isolated and rudimental, comparatively few of them obtaining connection with longitudinal nervures. Cross veinlets plentiful in the larger portion of the fore wing, but scarce or absent in the immediate vicinage of the terminal margin and within the area bounded anteriorly by the anal (8) nervure, and absent from the marginal area before the bulla; those of the pterostigmatic space, in all the described species, are for the most part divided near the costa, and their branchlets intercommunicate so as to enclose a series of small irregular cellules upon the costa. In the anal-axillar interspace of the same wing are 3 long intercalar nervures, and as few or fewer short isolated rudiments of others, one of the latter usually standing in the interval between the first and the second of the former. Of the three longer intercalars quoted, the intermediate is the longest; and this is connected with the anal nervure either directly (turning aside a little, anteriorly, to unite with it as a branch) or indirectly (by blending with a cross veinlet), and sometimes, in addition to that terminal connection, a cross veinlet establishes further communication between them. In like manner the first of the three may be connected directly or indirectly with the anal nervure, and the third with the second intercalar; otherwise the first remains isolated, and the third is simultaneously in communication both with the first axillar (9¹) and with the intermediate intercalar nervures by uniting at its inward extremity with cross veinlets [compare Etn., *op. supra cit.* pl. ii. 5. Pictet's figure, Pict. *op. ibidem cit.* pl. xxxii. 1, is untrustworthy in detail].^{p. 320} Guard at the aperture of the mesothoracic spiracle small and triangular. Forceps-limbs of ♂ 3-jointed, stout, the intermediate joint long, the others very short.

Abdomen of ordinary proportions; segments 2-7 of nearly uniform length, shorter than segment 8 (which is the longest) or 9; segment 10 short; the postero-lateral angles of the dorsum in segments 8 and 9 are acute and slightly prolonged; forceps-basis entire, the homologous lamina of the ♀ obtuse. Lobes of the penis without apparent stimuli. Median caudal seta subequal to the others, which in both sexes are about as long as the body. Ungues in every tarsus dissimilar each to the other. Fore tarsus of ♂ about $1\frac{1}{5}$ as long as the tibia, which is nearly twice as long as the femur; its joints, in diminishing order, rank 2 & 3 subequal, 4, 5, and 1. Fore tarsus of ♀ (excluding joint 1) about $\frac{3}{4}$ as long as the tibia and joint 1 combined; the femur about as long as the tarsus, whose joints rank 2, 3, 5, 4. Hind tarsus (excluding joint 1) about $\frac{5}{7}$ as long as the tibia and joint 1 combined; its joints rank 5, 2, 3 subequal to 4. The first joint in these tarsi is obsolescent. *Nymph* latent under stones or at the roots of water-weeds, in streams and rivers. Body broadest at the mesothorax; head slightly narrower than the pronotum, and in anterior view trilateral, with the vertex arched and the oral region truncate; antennæ inserted about midway between the anterior ocellus and the sides of the face; that ocellus is smaller than the others; oculi moderately distant from each other in ♂. Pronotum transversely quadrangular, arched above, nearly straight at the sides, and obtuse at the anterior lateral angles. Abdomen plump, slightly convex beneath, and somewhat quadrangularly arched above in segments 2-9; pleuræ dilated considerably in segments 3-8, slightly concave above, fringed with clavate or spathulate hairs, and contributing to form, with the steeply sloping sides of the dorsum, a hollow for the lodgment of the tracheal branchiæ; those of segments 2 and 3 are obliquely truncate at their posterior angles, but the pleuræ of segments 4-7 are there acuminate pointed, and constitute a series of uncinate serratures on each side of the body; the pleuræ of segment 8, less largely developed than their predecessors, are posteriorly more acutely pointed in ♂ than in ♀; those of segment 9 terminate behind each in a triangular point, which is perpetuated in the imago. The angularity of the dorsal arch, above referred to, is due to longitudinal series of protuberances, ridges, or tubercles, one on each side of the middle of the back, extending from segments 2-9; in segments 2 and 3 each prominence is surmounted by an acute conical tubercle; in segments 4-7 each ridge terminates behind in an unciform tubercle pointing towards the tails; in segments 8 and 9 the ridges end abruptly. Abdomen broadest in segment 4 or 5, narrower posteriorly than in front; a line drawn touching the outer edges of the pleuræ on each side would describe a curve. Tracheal branchiæ are borne by segments 3-7, and diminish in size successively from the foremost; those of segment 7 are completely obtected by the preceding pair. The foremost laminæ are broad and obliquely quadrilateral, with the corners obtuse or rounded off, and have their greatest extension between the lower anterior and the upper posterior corners; the margin below the latter of these is slightly retuse; the trachea enters the lamina near the former. The hindermost of the tracheal branchiæ have ovate laminæ, auricled obtusely at the base on the lower side. The other branchiæ exhibit gradations of form intermediate between these. Caudal setæ nearly $\frac{3}{4}$ as long as the body; for some distance from the roots only their joinings are setulose and their joints nude; afterwards, until shortly before their extremities, the joinings are beset with

longer and sharper setulæ, mingled with minute spreading hairs, while the joints become narrowly plumose or distichously pubescent; towards their extremities the joints are again nude, and their joinings beset with verticils of very minute hairs. Palpus of maxilla I. about $\frac{2}{3}$ as long as the lacinia; its terminal joint is subequal in length to the remainder, and joint 2 is longer than joint 1. Laciñæ of maxilla II. broader than the lobes of the labium. Hind leg the longest; the tarsus (claw excluded) about $\frac{1}{3}$ as long as the tibia. Fore femur smooth underneath in the typical species; the tarsus nearly $\frac{2}{3}$ as long as the tibia. Antennæ setaceous, of moderate length, with minute verticillate hairs at the joinings.

Synonymy. *Leptophlebia*, Westwood, 1840 (part); *Potamanthus*, Pictet, 1843-5 (part).

Type. *E. excrucians*, Walsh.

Distribution. Northern Temperate Regions.

Etymology. A hybrid combination of a Greek derivative with the Latin diminutive "ella."

Nymphs of the typical form inhabit N. America as well as Europe. *E. ignita* ♂ im., with *L. marginata* ♀ im., were contypical of the unrestricted *Leptophlebia*.

EPHEMERELLA IGNITA, Poda. Plate XIV. a (legs, ♂ head and forceps).

Ephemera ignita, Poda, Ins. Mus. Græc. 97 (1761).—*E. erythrophthalma*, Schr., Fn. Boica, ii. pars ii. 197 (1798).—*E. fusca*, ! & *diluta*, Steph., Ill. Brit. Ent. vi. 58 (1835).—*E. apicalis*, ! *rufescens*, ! & *rosea*, ! id., op. cit. vi. 59 (1835).

! *Baetis obscura*, ! id., op. cit. vi. 65 (1835); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 558 (1853).

Potamanthus erythrophthalmus, Pict., Hist. Nat. Névropt. ii. Ephém. 222, pls. xxix. [written in error "erythrocephalus (larve)"] & xxx. [adult] (1843-5); Walk., List &c. 544 (1853); Hag., Ent. Ann. (1863), 21.—? *P. gibbus*, Pict., Hist. &c. 226, pls. xxxi. & xxxii. [im. & subim.] (1843-5); Walk., List &c. 544 (1853).—? *P. aeneus*, Pict., Hist. &c. 229, pl. xxxiii. [egg, nymph, subim., & adult] (1843-5); Walk., List &c. 545 (1853).—*P. apicalis*, Pict., Hist. &c. 236 (1843-5); Walk., List &c. 544 (1853).—*P. dilectus* [for *dilutus*], Pict., Hist. &c. 236 (1843-5).—*P. dilutus*, Walk., List &c. 545 (1853); Hag., Ent. Ann. (1863), 19.—*P. roseus*, Pict., Hist. &c. 236 (1843-5); Walk., List &c. 545 (1853).

Ephemerella ignita, ! Etn., Trans. Ent. Soc. London (1871), 98, pls. ii. 5 [wing] & v. 7-7 a [details]; Meyer-Dür, Bull. Soc. Ent. Suisse iv. 316 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 85 (1878).—? *E. gibba*, Etn., Trans. Ent. Soc. London (1871), 99; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 316 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 85 (1878).—? *E. anea*, Etn., Trans. Ent. Soc. London (1871), 99; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 316 (1874).

Subimago (living).—Wings black-grey, the wing-roots and sometimes the hind wings greyish white. Femora olive-grey, often with a dark band before their distal extremity; tibiae grey; tarsi black-grey or grey-black. Setæ brownish grey with red-brown joinings.

Imago, ♂ (living).—Upper division of eyes brownish red or burnt sienna; lower division olivaceous, or sometimes rather yellower. Head and prothorax olivaceo-fuscous; meso- and metanotum fuscous or jet-black. Abdomen above dark reddish fuscous, with the opaque tips of the segments sometimes narrowly ochraceous, and often with the sides of the segments tinged with the same colour; the last segment paler, sometimes dull greenish: venter sometimes light- or warm-sepia brown, sometimes fuscous or greenish

fuscous, the segments sometimes each with a pair of short dark divergent lines followed by two dots at the base, the 9th segment often brown-ochreous, with a longitudinal piceous streak along each side. Setæ sepia-grey with darker joinings; forceps testaceous or greenish grey. Legs either almost sulphureous, with the fore tibia lutescent and all the tarsi testaceous; or with the fore femur yellowish- or olivaceous-grey, the hinder femora paler and tinged rather more with yellowish, the fore tibia dark olive-grey, the tarsi and hinder tibiae grey; a diffused obsolescent or nebulous rubigineous band is sometimes perceptible at the extremity of the femur, and the unguis are often piceous. Wings vitreous, with the stronger nervures and sometimes the bulla almost faintly piceous or amber-colour.

♀ (*living*).—Eyes dark olivaceous; vertex of head marbled with black, pale ochreous or orange, and grey. Pronotum olivaceo-fuscous varied with pitch-brown. Meso- and metanotum pitch-brown. Abdomen more opaque and tinged with dull greenish than in the ♂, but rather similar: the borders of the dorsal vessel dark. Legs olivaceous, the femora with a grey band just before their pale distal extremity, the fore tibia sometimes testaceous, the tarsi greyish. Wings much as in the ♂, but sometimes with the bulla more distinctly coloured. The ventral lobe of the penultimate segment is slightly retuse; and the pleuræ of the 8th segment are posteriorly acute. Eggs green, becoming browner when dried. Length of body, ♂ 6–9, ♀ 6–10; wing, ♂ 7–9, ♀ 7·5–11; setæ, ♀ im. 7 & 8–12 & 11, subim. 8 & 7; setæ, ♀ im. 7 & 8–8 & 9, subim. 7 & 9 millim.

Hab. Europe, from Portugal, near Cintra (300–400 ft. alt.), Madrid, and mid-Italy, near San Marcello, in the Apennino Pistoiese (2100–2700 ft. alt.), northwards to Great Britain, and at least to Holland and Germany; but the extent of its continental range farther north and east is not yet ascertained. In England the fly is plentiful from June till September; but it was common at the end of April in Portugal. The nymph varies greatly in colour; the darkest and most strongly marked specimens are prevalent in trout-streams, those of lighter colours in warmer streams and rivers, the variations being largely determined by the nature of the bottom. I believe that Pictet was mistaken in describing as distinct species merely colour-variations of this one; and that some of the differences indicated by him in the adult flies are attributable to the ordinary mutations of colour undergone by them during their advance to full maturity, and during the decline of life. The form of the forceps-basis in my earlier figure (1871) differs from that in Pl. XIV. 24 *a*, in the breadth of the extremity of the median projection; but this is only because the insect was then not adjusted so well for drawing as the more recent subject. The part which is shaded thereabouts in the former figure was hidden when the newer drawing was made, and the acute unshaded portion was brought into full view, by throwing the extremity of the insect further back.

EPHEMERELLA INERMIS, sp. nov.

Subimago (dried).—Fore wings transparent, light brownish grey, with neuration in some lights dull greenish grey, changing in other lights to dull light yellowish, the membrane and opaque longitudinal nervures becoming dirty brownish white near the wing-roots; hind wings rather pale. Setæ dark sepia-grey, with black joinings. Legs

dull light-brownish yellowish, the fore tarsus and distal portion of the tibia, and in the hinder tarsi the unguis, tip of the terminal joint, and distal borders of the other joints brownish, the brown being sometimes modified with reddish.

Imago (dried), ♂.—Thorax above polished, and of a rich deep pitch-brown, the anterior half of the mesonotum in one example much lighter in the midst. Abdomen above either pitch-brown, with the last 3 segments rufescent, and the lateral borders of the dorsum light yellowish; or dark rufo-piceous, with the last segment yellowish; the joinings opaque. Venter lighter than the dorsum; genitalia light yellowish. Setæ whitish sepia-grey, with black joinings. Wings vitreous; the neuration in some lights colourless, the longitudinal nervures in other positions becoming faintly tinged with light greenish grey, changing in other positions to very light amber; at the wing-roots of the fore wing is, apparently, a light pitch-brown spot. Fore leg, as an opaque object, dull greenish grey, with the coxa, trochanter, and knee lighter, the tarsus dirty whitish or greyish white, with the joinings and unguis brownish; in transmitted light the femur becomes light yellow-amber. Hinder legs in opaque view, with the femur and base of the tibia, yellowish amber, the distal portion of the tibia, and the tarsus dirty whitish, the latter having the unguis, the end of the terminal joint, and the distal borders of the other joints light reddish-brown.

♀. Thorax above polished brown-ochreous; the pronotum destitute of raised dots. Abdomen discoloured; ventral lobe of the 9th segment broadly rounded and almost entire, the pleural points obtuse. Wings as in ♂, but with the longitudinal nervures rather more definitely coloured. Legs very similar to the hinder legs of the ♂, but in one of the specimens only the unguis and not the joinings of the hinder tarsi are light brownish. Length of body, 5-6; wing, 6-8 millim.

Hab. Colorado, at Denver, Arkansas Cañon, and Colorado Springs (Mus. Comp. Zool. Cambridge, Mass.).

EPHEMERELLA GRANDIS, sp. nov. Plate XIV. 24 b (neuration).

Subimago (dried).—Wings dark sepia-grey, or sometimes of a slightly blacker grey, with dark neuration, excepting at their extreme base, where both nervures and membrane are more or less of a dull greenish-yellow, varied with brownish. Coxæ, trochanters, hinder tibiæ and tarsi, fore tarsus, and sometimes the fore tibia very pale reddish (burnt-umber) brown: femora pitch-brown. Setæ pitch-black at the base and then sepia-brown.

Imago, ♀ (dried).—Thorax bright brown-ochreous. Abdomen shrunken through desiccation, and discoloured; in one example the colours along the middle of the dorsum have considerably changed, but on both sides the segments are narrowly bordered with dull ochraceous along the pleuræ, and a series of large rounded blotches of a dark purplish brown colour [pitch-brown modified with intense burnt-carmine] occupies the immediately adjoining parts of the intermediate segments (perhaps excepting segment 9). Setæ in opaque view pitch-black near the roots and then pitch-brown; in transmitted light the black changes to pitch-brown, and the lighter parts appear whitish warm sepia-grey, with rufescent joinings. Ventral lobe of segment 9 emarginate; the pleural points

short and acute. Wings vitreous, the fore wings tinged slightly with light brownish grey in the pterostigmatic region of the marginal and submarginal areas; neuration piceous, strongly defined (excepting the cross veinlets in a large extent of the marginal and submarginal areas, and those in a small portion of the next area of the fore wing), the longitudinal nervures becoming lighter at the wing-roots. Fore legs in opaque view pitch-brown, lighter or more nearly raw-umber brown from the coxa to the base of the femur; in transmitted light the tibia and tarsus are less opaque than the femur, the dark parts become rufo-piceous, and the lighter parts somewhat of an amber-colour. Hinder femora similar in colour to the fore femur; but the tibiæ and tarsi are uniformly whitish yellow-ochre, with the ultimate joints and unguis, or in some lights the whole of the tarsus, clove-brown. Length of wing, ♀ 15–18; setæ, ♀ im. 16–17, subim. 15 millim.

Hab. Colorado (M^oLach. Mus.); The Geysers, Yellowstone, 4th of May (Mus. Comp. Zool. Cambridge, Mass.). The arrangement of the colouring matter of the abdomen in the specimen described above is not to be implicitly trusted.

EPHEMERELLA WALKERI (renamed).

‡ *Baëtis* || *fuscata*, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 570 (1853) [part] : Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 47.

Imago, ♂ (dried).—Thorax above dark pitch-brown, varied on the pleuræ and sternum with light burnt-umber brown. Abdomen discoloured, dark pitch-brown. “Fore legs piceous” (*teste* Walk.); hinder femora dark rufo-piceous, the tibiæ and tarsi dull pale subtestaceous. Wings transparent, their longitudinal neuration in some lights pale fuscescent. Length of wing 8 millim.

Hab. St. Martin’s Falls, Albany River, Hudson’s Bay (Dr. Barnston); one example in Brit. Mus. The ♂ subimago doubtfully referred to this species by Mr. F. Walker is still in the collection, and is most probably a *Rhithrogena*. The name given by Walker to this species, having been preoccupied in *Baëtis*, is superseded: had he not published a description of the type-specimen, it might well have remained nameless and undescribed.

EPHEMERELLA INVARIA, Walker. Plate XIV. 24c (penis).

‡ *Baëtis invaria*, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 568 (1853); Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 48.

Ephemerella invaria, ! Etn., Ent. Mo. Mag. v. 87 (1868); ! id., Trans. Ent. Soc. London (1871), 100, pl. v. 8 a [details].

Imago, ♂ (dried).—Thorax above light rufo-piceous; abdomen discoloured,—dorsum fuscescent, the joinings opaque, the last two segments modified with light dull reddish orange,—venter greyish, the base of the forceps, and the two or three segments immediately preceding it, light brown ochre. Fore femur and tibia reddish golden brown, the latter with a dull light reddish spot near its distal extremity, the tarsus yellowish white; hinder femora translucent, very light straw-colour or pale yellowish-fuscescent, the tibiæ and tarsi dull whitish, with the apical edges of the joints and the unguis fuscescent. Wings transparent, their neuration usually colourless, but in one instance distinctly pale fuscescent. Length of wing 8–10 millim.

Hab. St. Martin's Falls, Albany River, Hudson's Bay (Dr. Barnston); 3 examples in Brit. Mus.

EPHEMERELLA EXCRUCIANS, Walsh.

Ephemerella [type] *excrucians*, ! Walsh, Proc. Acad. Nat. Sc. Philad. (1862), 377; Hag., Proc. Ent. Soc. Philad. ii. 178 (1863).—*E. † invaria* (part), ! Etn., Trans. Ent. Soc. London (1871), 100.

Subimago (dried).—Wings very light ochraceous grey, changing in some postures to whitish grey, with subopaque neuration of a similar whitish- or faintly whitish yellow-amber tint. ♂ femora in opaque view light yellow-ochre, changing to light yellow-amber in transmitted light; tibiæ and tarsi dull whitish, the unguis and ends of the terminal joints of the hinder tarsi brownish, the fore tibia and tarsus in opaque view dull brownish, but in some lights dull yellowish; legs of ♀ lighter, with pale brownish unguis. Setæ light sepia-grey, their joinings at most opaque.

Imago, ♂. [Oculi in life (*fide* Walsh) egg-yellow above, pale fuscous below.]—(*Dried*):—Thorax above piceous or light rufo-piceous: abdomen rufo- or fusco-piceous above, with opaque joinings, the last two segments tinged with dull light reddish orange; venter greyish or yellowish, the last two or three segments and the bases of the forceps light brown ochreous. Setæ whitish, with fuscous joinings. Wings vitreous, with colourless neuration. Hinder femora very light yellow-amber; fore femora darker, and of a browner yellow-amber in opaque view; hinder tibiæ and tarsi dull yellowish or brownish white, the tips of the tarsi and the unguis light brownish; fore tibia in opaque view dull yellowish brown, with a light brownish spot at the tip, the tarsus rather lighter, with brown unguis, but in transmitted light they are both brown-ochreous white, the tibia becoming light yellowish amber towards its base, but marked at the tip, as before, with the opaque brown spot.

♀ (*dried*).—Body yellow-ochreous, the head, pronotum, and abdomen sometimes reddened, the abdominal joinings subopaque or darker than the rest of the segments: on each side of the pronotum, close to the hinder border, directly in front of the sutural furrow in advance of the wing-roots, is a raised reddish-brown dot. Legs similar to the hinder legs of the ♂. Wings vitreous, with colourless or whitish neuration, the fore wings with 9–11 cross veinlets in the marginal area beyond the bulla (counting them along the subcosta). Setæ white, sometimes with the first 2 or 3 joinings reddish. Venter nearly of the same colour as the femora in segs. 1–7, and then darker; the lobe of the 9th segment broadly rounded off and almost entire. Length of body (after Walsh), 5·5–7·5; wing, 6–8; setæ, ♂ im. 11–13, ♀ 9–12·5 millim.

Hab. Rock Island, Ill. (Walsh); Detroit, Mich. (Mus. Comp. Zool. Cambridge, Mass.). Two ♂ im. in the Brit. Mus. were named by Mr. Walsh.

EPHEMERELLA CONSIMILIS, Walsh.

Ephemerella consimilis, Walsh, Proc. Acad. Nat. Sc. Philad. (1862), 378; Etn., Trans. Ent. Soc. London (1871), 100.

According to Mr. Walsh, this insect differs from *E. excrucians* in the form of the mesothorax, which in *E. consimilis* is 4–5 times as wide instead of less than thrice

as long as wide, and has the præscutum half as long again as wide instead of scarcely longer than wide. Sternum ferruginous, legs immaculate, but the tip of the fore tibia and the adjacent joint of the tarsus in the ♂ fuscous. Length of body, ♂ 5, setæ about 5; expanse of wings 14 millim.

Hab. Rock Island, Ill. Described from a single defective specimen.

Several undescribed North-American species of *Ephemerella* are scantily represented in the collections referred to, which it seems undesirable to characterize.

EPHEMERELLA ELONGATULA, M^cLachlan.

Leptophlebia elongatula, ! M^cLach., Trans. Ent. Soc. London (1875), 169 (part).

Imago (dried), ♀.—Body intense jecinoreus. Setæ blackish fuscous. Wings vitreous, with the costal margins of the fore wings narrowly brownish yellow; neuration fuscescent, the longitudinal nervures towards the wing-roots, and the proximal halves of the subcosta and radius of the fore wing, yellowish. Length of wing 14 millim. [Abstracted from M^cLachlan's description.]

Hab. Yokohama (Pryer, in Wormald's Mus.). The ♀ subimago attributed to this species in 1875, probably through an error on my part, is apparently a *Heptagenia*.

FIVE NYMPHS ALLIED TO *Ephemerella*, *sedis incertæ*.

NYMPH No. I.—Pl. XXXVIII. 1–10 (whole figure & details).

Perhaps an *Ephemerella*, but differing from the nymph of the typical form in the following particulars. Abdomen broadest in front, tapering gradually to the end of the 9th segment; the pleuræ nearly straight along their outer sides, their hinder corners in segments 4–7 nearly right-angled, those in segments 8 and 9 shortly prolonged into acute triangular points; a line drawn touching the outer edges of the pleuræ on each side would be curved only in a very slight degree. Tracheal branchiæ obtusely rounded off distally. Anterior, or inferior, edge of the fore femur minutely denticulated. Joints 1 and 2 of the palpus of maxilla I. subequal to each other; joint 3 rather shorter. Length of body 8·5, setæ 6 millim.

Hab. Washington Territory; Wenass V., W. T., Taylor's, 6th July; Klikitat V., W. T., Thorpe's, 10th July, S. Henshaw (Mus. Comp. Zool. Cambridge, Mass.).

NYMPH No. II.—Pl. XXXVIII. 11–15 (whole figure & details).

Perhaps an *Ephemerella*, tuberculate on the vertex of the head and the notum, and with rows of spines instead of tubercles on the dorsum; also with the abdominal pleuræ wider than in the typical species, and the proximal joint of the palpus of maxilla I. relatively longer.—Head vertical, with an erect elevated and acute triquetrous tubercle on each side of the crown above the inner orbit of the oculus, terminating a low blunt ridge ascending in a curve from near the posterior ocellus, and with a small rounded wart-like protuberance on the vertex, intermediate between that and the median longitudinal ridge; occipital border slightly prominent. Pronotum narrower in front than behind,

sparingly tuberculated at the sides, and posteriorly near the middle. Mesonotum with a pair of small tubercles on the præscutum, another tubercle at each of the lateral angles of the scutum, and a single tubercle on the scutellum. The dorsal spines on segments 3-9 are slender and somewhat unciform, with their points directed posteriorly. Length of body 14; outer setæ about 9 millim.

Hab. Klikitat V., W. T., Thorpe's (10. vii.; S. Henshaw, in *Mus. Comp. Zool.* Cambridge, Mass.).

NYMPH No. III.—Pl. XXXIX. (whole figure & details).

Body stouter than in the typical *Ephemerella*, and with neither tubercles nor spines upon the dorsum; sternum and venter apparently adapted for adhesion to smooth surfaces; antennæ remote from the ocelli, and inserted in the angles of right-angled excisions at the sides of the prominent front border of the frons; first joint of the palpus of maxilla I. about $1\frac{1}{3}$ as long as the second, the terminal joint about $\frac{1}{5}$ as long as these combined.—Body broadest at the mesothorax, narrowed in front; abdomen somewhat oniscoidal, broadest at the third and fourth segments; the pleuræ in segments 2-8 broad and relatively short, concave above, strongly rounded off in front, their outer margins less curved and meeting their oblique posterior margins at an acute angle; the pleuræ of segment 9 narrower and posteriorly more acute, the segment in dorsal view resembling somewhat a mitre with the cleft choked seen sideways; dorsum strongly arched, furrowed obliquely at the sides in segments 2-7 by grooves which ascend singly from their front margins at the bases of the pleuræ. These grooves are displayed in fig. 2. Venter densely velutinous, and (exclusive of the pleuræ) elongate-ovate, almost plane behind (the pleuræ being only very slightly prominent), but with a deep arched depression in front of the third segment, wherein is situated a smooth nude curved transverse furrow immediately adjacent to the anterior velvety boundary of the adhesive surface. This furrow is probably the channel for the readmission of water into the enclosure when the insect desires to be free after adhesion has been established. Beneath the thorax are two large and deep nude concavities, bounded by prominent sharply defined even margins, and divided from one another in front of the mesosternum; the anterior is widened angularly close behind the fore coxæ; the posterior resembles the impressure of an axe-head laid flat, edge towards the tail. Pronotum transverse, widest behind; its posterior lateral angles acute. Head vertical, transverse; in front view quadrilateral, slightly oblong and flattened; frons prominent and truncate in front (where it projects in advance of the mouth-parts), angularly excised at its anterior angles, and with nearly parallel sides; antennæ short; mouth-parts similar in type of construction to those of *Ephemerella*. Legs moderately long; femora flattened behind, spinulose or denticulated along their edges; hind tarsus about $\frac{2}{5}$ as long as the tibia. Tracheal branchiæ arranged as in *Ephemerella*, but their laminæ more obtuse. Length of body, ♀, 11, setæ 4 millim.

Hab. Colorado, in a brook at Idaho, adhering to the underside of a board, 5th July; Roaring Water Fork, Col., 2nd August, Lt. Wheeler (*Mus. Comp. Zool.* Cambridge, Mass.).

NYMPH No. IV.—Pl. XL. 1-17 (whole figure & details).

Synonymy. ? *Heptagenia* † *pudica* (nymphal-skin), ! Hag. Ann. Rep. U. S. Geol. & Geograph. Survey of the Terr. 1873, part iii. Zool. 582 (1875) [not *subimago*, p. 581].

Nymph-slough.—Mouth-organs and tracheal branchiæ of a type similar to those of *Ephemerella*; body stouter, the abdomen in its broadest part wider than the thorax, the dorsum unarmed, the venter convex; antennæ inserted about midway between the anterior ocellus and the sides of the face; first joint of the palpus of maxilla I. upwards of twice as long as the second, the terminal joint about $\frac{2}{3}$ as long as these combined; tracheal branchiæ borne by segments 4-7 of the abdomen, but probably absent from segment 1.—Body broadest at about the fifth abdominal segment, narrowed thence in both directions, but nearly as broad in the mesothorax; abdomen broadly oniscoidal, the pleuræ strongly developed in segments 2-9, and produced into slender acuminate recurved teeth, which are pilose where the tracheal branchiæ do not overlap them; the penultimate segment the longest, in dorsal view somewhat similar to a mitre with the cleft partly choked seen sideways. Caudal setæ of ♀ mutually subequal in length, and very nearly $\frac{1}{2}$ as long as the body; median seta plumose; outer setæ ciliated on the inner side near the roots, and plumose distally. Pronotum transverse, quadrangular, rather broader behind than in front, gently arched, slightly compressed on each side, and armed with a short conical tubercle on each side in the middle near the border. Legs pilose, very similar in their proportions to those of *Ephemerella*; femora prolonged at the knee each into a short acute spine; intermediate coxæ each armed above with a short conical tubercle. Head small, transverse, narrower than the pronotum, wider in front than behind, slightly constricted at the junction of the frons and vertex; integument minutely spinulose on the frons, pilose at the sides and in front; vertex transverse, oculi contiguous in ♂; frons prominent at the base in the vicinage of the ocelli and antennæ, and then broadly flattened out so as to form a transverse and projecting ledge or guard over and in advance of the mouth-parts, which ledge is truncate in front, rounded off at the fore corners (where it is broadest), straight-sided, narrowed posteriorly, and much wider than long. Length of body 15, setæ 7 millim.

Hab. Colorado, mountains and plains (Lieut. W. L. Carpenter; Mus. Comp. Zool. Cambridge, Mass.). The laminæ of the tracheal branchiæ of segments 4 & 5 are emarginate below the tip on one side; those of the other segments are entire. The palpi of maxillæ II., formerly described as 2-jointed, have 3 joints; but the small terminal joint is difficult to trace in the cast slough. The sloughs of the hind wings are separate from those of the fore wings, and are attached in the usual manner to only the hind border of the metanotum; their tips attain the base of the second abdominal segment. They were formerly described as being incorporated into the notal hood, in a manner similar to the hind wings of *Bætisca*.

NYMPH No. V.—Pl. XL. 18-20, & LXIV. 3-7 (whole figure & tracheal branchiæ).

Body moderately stout; mouth-organs and hinder pairs of tracheal branchiæ similar in type of construction to those of *Ephemerella*; abdomen in its broadest part wider

than the thorax, the dorsum tuberculated as in *Ephemerella*, the venter convex; insertion of antennæ intermediate between the anterior ocellus and the sides of the face; palpus of maxilla I. lost (or aborted?) in the specimen examined; tracheal branchiæ borne by segments 1 & 4-7 arranged as in *Cænis*.—Body broadest at about the fifth abdominal segment, narrowed thence towards the thorax and tails; abdomen oniscoidal, the segments very similar in form to those of Nymph No. IV, having the intermediate pleuræ produced in like manner into curved acuminate retrorse serratures (which are spinulose along their front edges and beset with long, fine scattered hairs), but having a series of uncinate tubercles on each side of the median line of the dorsum, extending from the first to the sixth segment, the tubercles standing singly at the hinder edges of the segments pointing backwards, and represented in the following three segments by small marginal teeth. Caudal setæ acutely and narrowly plumose, about $\frac{3}{4}$ as long as the body. Pronotum transverse, quadrangular with almost straight sides, about as broad as the head in front, and very little broader behind. Legs very like those of *Ephemerella*. Tracheal branchiæ of segment 1 minute, erect, 2-jointed, with the first joint short and the second joint more slender, filiform, and distally pilose or pubescent, arising from the dorso-pleural region rather behind the middle of the segment and near the lateral borders; those of segments 4-7 inserted in sinuses at the hinder bases of the pleuræ, and composed, like those of *Ephemerella*, each of a lamina sheltering lamellæ, but differing from their homologues in that genus in being compactly stratified rather than imbricated, those of segment 4 elytroidally shielding the others. Moreover, the branchial laminæ of at least segments 4-6 are each traversed by a crease from side to side, situated at about $\frac{2}{3}$ of the distance from the roots to the tip; and while the foremost is parchmentose in texture, all the other laminæ are papyraceous or membranous; whereas in the genus quoted the laminæ are not creased, and only the hindmost in each series is papyraceous. The laminæ diminish successively, chiefly in length; their form in segment 4 is narrowly suboval, somewhat abrupt at the base; in segment 5 each is broadly oval, truncate at the base; in segment 6 the laminæ are rotundate-subquadrate; the hindmost are almost semi-rotund. Length of body, ♂ 12, setæ 5 millim.

Hab. Detroit, Mich. (Mus. Comp. Zool. Cambridge, Mas.); M^oCollam's Lake, M^oHenry, Ill. (May; Foster in Mus. State Lab. Nat. Hist., Ill.). The eyes of the adult must be ascalaphoid; but the hind wings of the nymph differ from those of described genera of this section.

TELOGANODES, Etn. 1882.

Illustrations. Adult (wings), Pl. XV. 24 bis.

Adult.—Hind wing minute, obovate-oblong, angular in front nearly in the middle, with the apex of the angle inverted, and with the margin beyond the angle slightly concave; neuration very simple, consisting of the subcosta (2), radius (3), cubitus (5), and præbrachial (6), with or without a sector, and with scarcely a cross veinlet; subcosta nearly straight, terminating abruptly near the salient angle without meeting the costa; the common stem of the radius and cubitus makes an acute angle with the subcosta, and is met by the cubitus at a distance of about $\frac{1}{3}$ of the wing's length from the wing-roots;

the irregularly sublinear marginal area is broadest in proximity to the great cross vein; the submarginal area, widest at the anterior angle of the wing, and subtriangular in form, with its outer side slightly concave, contains a few traces of obsolescent cross veinlets, of which another is sometimes distinguishable in the next area subjacent. In the fore wing, most of the intercalary nervures are rudimental and isolated; the cross veinlets are absent from the portion of the marginal area preceding the pterostigmatic region, as well as from the terminal margin, but are numerous elsewhere in advance of the anal (8) nervure, although obsolescent in parts. The intercalary neuration of the anal-axillar interspace of the same wing is less scanty in larger specimens than in the small example figured; but the series of adults available for comparison is too limited for descriptive purposes. Forceps-limbs of ♂ 3-jointed; the proximal joint stout, tapering distally from the base, and rather longer than the slender second joint; terminal joint short and small. Forceps-basis entire, and seemingly very short; ventral lobe of ♀ segment 9 obtusely rounded off and entire. Penis-lobes linear or subulate, and contiguous. Median caudal seta aborted; outer setæ about twice as long as the ♀ body. Tarsal unguis each unlike the other in every leg. Fore tarsus shorter than the ♂ tibia; its joints in diminishing sequence rank 2, 3, 5, 4, 1; the other proportions of the legs are unascertainable.

Nymph unknown.

Type. *T. tristis* (in *Cloë*), Hag.

Distribution. Ceylon.

Etymology. τέλος and γανώδης, in allusion to the wings becoming clear and bright in the imago. The type was named *tristis* from the dinginess of the wings of the sub-imago,—heretofore the only grade described.

TELOGANODES TRISTIS, Hagen. Plate XV. 24 bis (wings).

Cloë tristis, ! Hag., Verh. zool.-bot. Gesells. Wien, viii. 476 (1858); Etn., Trans. Ent. Soc. London (1871), 131, note.

Leptophlebia [Etn.] *tristis*, Hag., op. cit. (1873), 394.

Teloganodes [type] *tristis*, ! Etn., Ent. Mo. Mag. xviii. 208 (1882) [undescribed].

Subimago (dried), ♀.—Wings translucent, talcose, deep warm-sepia brown verging upon sooty black; neuration sometimes like-coloured, but at others many of the longitudinal nervures are black: the pterostigmatic space of the fore wing contains about 9 nearly straight simple cross veinlets at some distance from the bulla. Legs pale, sublutescent varied with piceous; the fore femur, the base and a subterminal band or spot of the fore tibia, and the terminal joints, unguis, and the extreme apical borders of the other joints of all the tarsi, besides the apical projections of the hinder femora, pitch-brown; the apical spinule, and a streak along the upper terminal border of every coxa black. Setæ pale sepia-grey, with black joinings. Abdomen discoloured; thorax pitch-brown; oculi during life (*teste* Nietner's MS. ticket) black.

Imago, ♀ (dried).—Wings transparent, very faintly tinted with extremely pale smoke-grey: longitudinal nervures (excepting near the wing-roots), the extreme edges of the wing, and the cross veinlets of the pterostigmatic space of the fore wing, black; wing-

roots piceous. Abdomen piceous with opaque joinings. Setæ brownish- or greyish-white, with deep-black joinings. Length of body, ♀ 5-6; wing 8-8.5; setæ, im., upwards of 15 millim.

Hab. Rainbodde, Ceylon, at upwards of 4000 ft. altitude. An adult ♂ in the British Museum, perhaps of this species, captured in Ceylon by Mr. G. Lewis, was noted by him as luminous at night. Being carded, it cannot well be described.

TELOGANODES MAJOR, sp. nov.

Subimago (dried), ♀.—Wings very similar to those of *T. tristis*; neuration concolorous with the membrane, the longitudinal nervures opaque; the pterostigmatic space of the fore wing contains upwards of 14 nearly straight, simple cross veinlets. Legs varying in colour, perhaps with age; fore femur pitch-black or pitch-brown; hinder femora pitch-brown or deep luteo-fuscous, with a dark longitudinal median streak; fore tibia lutescent; hinder tibiæ dull testaceous; tarsi either entirely blackish, or else only the terminal joint and unguis blackish. Body discoloured; setæ light sepia-grey, with black joinings. "Oculi during life red" (*teste* Nietner, MS.). Length of body, ♀ (shrunken) 8; wing 10-12; setæ about 25 millim.

Hab. Rainbodde, Ceylon, at an altitude of 4000 ft. and upwards. Two examples (Nos. 17 & 18) in Dr. Hagen's collection, and one (mistaken by me for *T. tristis* in 1871 [Trans. Ent. Soc. London, 1871, p. 131 note]) in the British Museum.

Third Series of Group II. of the Genera.

Adult.—The anal (8) and second axillar (9²) nervures, together with the margin of the fore wing, enclose a trilateral space, truncate or abrupt at its apex, and curved at the sides; anal nervure either contiguous with, or nearly approximated to, a pobrachial (7 or 7¹) nervure at the wing-roots; first axillar (19) curved or arched, sometimes falling short of the wing-roots. Hind wings absent, or small (*fide* Vayssièr), with the costa sharply angulated near the base, and the subcosta nearly straight. Thoracic spiracles relatively small, usually open in dried specimens; orifice of the metathoracic spiracle oval; that of the mesothoracic spiracle angular and short, without a guard, its upper lip convex externally, vaulted within, much larger than the lower lip, and with its edge bent almost at right angles in the middle. Forceps-limbs sessile upon the segment, at the sides of a large immovable lobe, which is represented by a lamina in the ♀. Eyes alike in both sexes, evenly contoured, round or oval, small and far apart. *Subimago* restless until the molting is imminent, which is speedily effected within a few minutes of the preceding ecdysis, when not retarded by torpor induced by exposure to cold.

This series of genera has affinity with the sections typified by *Ephemerella* and *Polymitarcys*. It is conveniently grouped with the former on account of the character of the nymphs of the section of *Caenis*. Where these differ essentially from those of the two sections already mentioned, they resemble nymphs of the section of *Leptophlebia*.

Their relationship to the section of *Polymitarcys* is traceable in the imago, viz. in the formation of the head, the sexual disparity in the proportional length of the setæ, the

texture of the wings and approximation of the anal (8) to the pobrachial (7) nervure at the base of the mesothoracic wing, and the brevity of the subimago period. The pronotum of the adult, similar in some respects to that of *Ephemerella*, has also an appreciable likeness to that of *Lachlania* and its allies; and it is noteworthy that free epinotal prolongations of the membrane continued from the wing-roots along the hind margin of the mesonotum, similar to theirs, exist in *Leptohyphes*—*Lachlania* and its kindred ranking next to the section of *Polymitarcys*, in the present system of arrangement. In marshalling European collections I have sometimes placed *Cænis* between *Oligoneuria* and *Polymitarcys*; and I believe Dr. Hagen and Mr. M'Lachlan are disposed to assign it that position.

But, on the other hand, at the present time no genus unquestionably referred to Group I. is known to have palpi conformable to the *Leptophlebia* type. Even *Jolia*, so similar in aspect to nymphs of the *Baëtis* and *Siphlurus* sections, has palpi of the *Palengenia* type; and *Euthyplocia*, while deviating slightly from the normal, clearly maintains through *Ephemera* a close connexion with the same group. If the transfer has to be effected eventually, on account of anything learned about nymphs yet to be discovered of genera in Group I., the consequent disturbance in the grouping of the sections may attain very considerable dimensions.

Section 7 of the Genera.—Type of *Cænis*. *Adult*.—Pronotum of ♀ transverse and short, closely appressed to the mesonotum, prominent and somewhat smooth above, and with a deep sinus in the middle of its hinder border. Hind tibia about $\frac{2}{3}$ as long as the femur, the tarsus little more than $\frac{1}{2}$ as long as the tibia. In the mesothoracic wing the longitudinal neuration is fully developed; the first and second axillary nervures (9¹ & 9²) enclose a narrow space, which for some distance from the inner margin maintains an almost even width, and does not extend to the wing-roots; wing-membrane ciliated along the inner and terminal margin, as in the subimago [except, perhaps, in *Leptohyphes*]. Hinder ocelli unusually large; the foremost extremely small [excepting, perhaps, in *Tricorythus maximus*]. *Nymph* [*Leptohyphes* unknown].—Terminal margins of the wings free [excepting, probably, in *Leptohyphes*]. Palpus of the 1st maxilla 3-jointed, longer than the lacinia; the latter crowned with a sparse tuft of hair, armed with spinous teeth at the tip, and ciliate on the inner edge. Lobes of the labium well developed, subovate, nearly as large as the laciniae of the 2nd maxillæ, which are ovate and acute. Abdominal tracheal branchiæ on segments 1–6; those of the first segment minute and erect; those of the 2nd segment elytroid, shielding the remainder, and differing from all the others in form and texture. Hinder lateral angles of the segments more or less prolonged. Natation laboured, aided by movements of the legs.

Nymphs of two genera in this section are known—*Cænis* and ? *Tricorythus*. *Cænis* has plumose caudal setæ, sparingly branched fringes to the hinder tracheal branchiæ, and has no appendages beneath their laminæ. The other nymph has the setæ minutely pubescent and setulose, like those of *Ephemerella*, laxly pectinate fringes to the obtected tracheal branchiæ, and an appendage on the underside of each lamina of the hinder pairs.

TRICORYTHUS, Etn. 1868.

Illustrations. Adult (details), Pl. XV. 25; (whole figure) see citations of Savigny and Pictet under *T. varicauda*. Nymph (?), Pl. XLI.

Adult.—Hind wings absent. Caudal setæ 3, mutually subequal in length, about as long as the body in ♀, and twice as long in ♂. Cross veinlets multiserial, numerous in the midst of the wing and of the marginal area (but rudimentary in the latter), remote from the terminal and inner margins; these margins are devoid of isolated rudiments of veinlets, and the longitudinal nervures of branchlets. The anal-axillar interspace contains two well-developed intercalar nervures; the nearest to the anal (8) nervure describes a simple curve, and meets the first axillar (9¹) at a point nearly in a line with the junction of the branches of the pectoral (7) nervure, and of the sector (4) with the cubitus (5), and at a distance from the inner margin of about $\frac{3}{7}$ of the interval between its own extremity and the costa; the hinder intercalar meets the anterior near its inward termination, and its extremities are curved slightly in opposite directions, somewhat like the stem of an italic *f*; hence the intercalars simulate a deeply forked nervure annexed to the first axillar. The recurrent membrane of the wing-roots does not extend beyond the point of the scutellum. Ventral lobe of ♀ segment 9 obtuse. ♂ unknown to me; proportions of legs unascertained. *Nymph* [*Cænis maxima*, Joly, is perhaps a *Tricorythus*, and is provisionally described as such, pending identification].—Body broadest at the mesothorax; head slightly narrower than the pronotum, and somewhat similar in contour to that of an *Ephemerella*. Pronotum quadrangular, oblong, with sharply defined angles. Abdomen slender in comparison with the anterior portion of the body, broadest about the 4th segment, and tapering slightly posteriorly, but nearly as broad in front; segments 2–5 combined are about $\frac{1}{2}$ as long as the posterior segments united; dorsum arched; venter slightly convex; pleuræ somewhat dilated, and similar in character to those of *Ephemerella*, but less obviously ciliated, their hinder angles acute in the anterior segments, but gradually more and more prolonged and acuminate in the posterior segments. Dorsal tracheal branchiæ issue from the antero-lateral angles of the 1st segment, from the posterior margins at the bases of the pleuræ of segments 2–5, and from the disk of the 6th segment at a point in line with the insertions of the four preceding; those of segment 1 [testa Vayssière], lost in examples examined by me, are minute, subulate, hirsute, jointed close to their insertion, and erect; those of segment 2, large, elytroid and coriaceous, obect the hinder pairs completely, and are hitched together by their adjacent inner edges, where a row of short stiff ascending hairs inserted along the margin of the right elytron is caught by a flange projecting from beneath the margin of the left elytron; moreover the same elytroid laminæ are securely held down anteriorly by the hind margin of the segment, which is bevelled or under-cut to receive their front edges, and has a small projecting triangular tooth in the middle, affording further support; each elytron, subquadrate in the main, with the outer side and the angles adjacent thereto rounded off, is externally convex and nude, ciliated with hairs of peculiar form along its outer and terminal margins, and is traversed obliquely by a ridge running from the place of attachment towards its inner posterior angle; each on the underside is largely concave,

and supports a short lax filiformly dissected appendage, projecting diagonally from the point of attachment into the concavity. The other tracheal branchiæ are smaller, closely imbricated, decumbent, parchmentose, ovate-triangular, concave beneath, and fringed with crowded, long, unilaterally branched, lax filamentose fimbriæ ; and [*teste Vayssiére*] each of them shelters in its concavity a filamentosely dissected appendage. Caudal setæ about $\frac{2}{3}$ as long as the body, rather similar to those of *Ephemerella* in the quality and disposition of their hairs, but lacking pilosity. Various parts of the body are beset with peculiar hairs resembling those of *Ephemerella* and *Trombidiid Acarina*. Hind leg the longest, the tarsus (claw excluded) about $\frac{3}{5}$ as long as the tibia; fore tarsus nearly as long as the fore tibia. Antennæ of moderate length, subulate, almost nude.

Type. *T. varicauda* (in *Cænis*), Pict.

Distribution. Upper Egypt and Cape of Good Hope; also (undescribed sp.) the Malay Archipelago. The nymph described inhabits the south of France.

Etymology, τρικόρυθος, with triple plume.

TRICORYTHUS VARICAUDA, Kollar, MS.

Ephemera [Savigny, Descript. de l'Egypt. Hist. Nat. i. 194 (Explic.), ii. Névropt. pl. ii. 6, 7 (1817)].
Cænis varicauda, Pict., Hist. Nat. Névropt. ii. Ephém. 281, pl. xlivi. 5 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 581 (1853).

Tricorythus varicauda, Etn., Ent. Mo. Mag. v. 82 (1868); *id.*, Trans. Ent. Soc. London (1871), 92, pl. ii. 3, 3 a [wing, after Savigny].

Adult (dried), ♂.—Body pale yellowish; eyes and a spot on the frons black. Mesothorax rather darker laterally, with some longitudinal black marks [sutures?]. The last five segments of the abdomen have each a black dot ("point") above. Setæ white, finely annulated with black. Legs yellowish, with some greyish clouds. Wings and neuration slightly yellowish, except the subcosta and radius ("la costale et la sous-costale"), which are rather darker, without being quite so dark as in *Cænis argentata* and *C. halterata*. Length of body, ♂ 4, expanse of wings 10, length of setæ 9 mm.

Hab. Upper Egypt. [After Pictet.]

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TRICORYTHUS DISCOLOR, Burmeister.

Oxycypha discolor, Burm., Handb. d. Ent. Bd. ii. Abth. ii. 797 (1839).

Cloeon discolor, Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 577 (1853).

Cænis discolor, Etn., Trans. Ent. Soc. London (1871), 96; ! Hag., *op. cit.* (1873), 399 [*C. albida*, Winthem, MS.].

Subimago (dried), ♀.—Head dull dark grey above; pronotum greyish fuscous, meso- and meta-notum dull lutescent or brown-ochre; dorsum of abdomen dark cinereous, venter and eggs ochraceous; setæ white, pubescent. Wings throughout very pale sepia-grey, translucent; longitudinal nervures subopaque, slightly brownish; cross veinlets very indistinct; the darkened appearance of the costal border is due merely to the subcosta and radius being closed together by shrinkage of the membrane. Legs pale flavescent; the fore-femur edged with fuscous, the tibia and tarsus dark sepia-brown. Length

of body, ♀ (eggs discharged, and therefore shrunken) about 5·7; wing 10; setæ about 8-9 mm.

Hab. Cape of Good Hope (Burm.). Described from a specimen in Dr. Hagen's collection (Winthem). The comparative elongation of the wings noticed by Dr. Hagen (1873) is doubtless due to the sex of this example.

TRICORYTHUS (?) sp. (nymph). Pl. XLI. (whole figure and details).

Cænis or *Cænis maxima*, Joly, Bull. Soc. Hist. Nat. Toulouse, iv. 144, pl. —? (1870); *id.* Rev. d. Soc. Savants, ser. 2, iii. 69-72 (1873); *id.* Feuil. d. Jeun. Nat. ann. 6, 53-4, pl. ii. 7 (1876); ! Etn., Ent. Mo. Mag. xvii. 196 (1881).

Tricorythus, ! Vayssiére, Ann. d. Sc. Nat. 6^e sér. Zool. xi. 3, 4, pl. i. 1 (1881); *id.*, *op. cit.* xiii. 65, pls. vi. 54, viii. 81-90 *bis*, & ix. 94-97 (whole figure and details).

Adult unknown.

Nymph of mature age; length of body 10, outer setæ 7 mm.

Hab. The Garonne near Toulouse (Dr. E. Joly). I am disposed to suspect that this nymph has been too hastily referred to *Tricorythus*; the adult may be of a genus at present unknown; but I could not distinguish the neuration of the wings satisfactorily in the nymph, and therefore this is only a conjecture.

LEPTOHYPHES, Etn. 1882.

Illustrations. *Adult* (detail), Pl. XV. 25 *bis*.

Adult, ♀.—Hind wings absent. Caudal setæ 2, about as long as the wings. Cross veinlets multiserial, numerous in the larger portion of the wing, but absent from the marginal area and from the vicinage of the terminal and inner margins; these are devoid of isolated rudiments of veinlets and perhaps of fringes, and the longitudinal nervures have no branchlets at their terminations. The anal-axillar interspace contains two well-developed intercalar nervures, each of which, like the 1st axillar (9¹), is met at its anterior extremity by two cross veinlets,—one from each of the nearest adjacent nervures; the anterior of these intercalars is a little the larger, nearly straight, and is connected by several obsolescent cross veinlets with the anal (8) nervure, to which it is subparallel; the hinder intercalar is almost imperceptibly curved, nearly bisects the area intervenient between the first intercalar and the first axillar nervures, and is connected more strongly with the former of these than with the latter. The recurrent membrane of the wing-roots projects as a subulate point beyond the peak of the scutellum. Other particulars unascertained. ♂ unknown.

Type. *L. eximus*, Etn.

Distribution. Argentine Republic.

Etymology. $\lambda\epsilon\pi\tau\omega\phi\eta\zeta$, finely woven; referring to the tenuity and relative abundance of cross veinlets.

LEPTOHYPHES EXIMIUS. Pl. XV. 25 *bis* (wing).

Leptohyphes eximus, ! Etn., Ent. Mo. Mag. xviii. 208 (1882, Feb.).

Adult (dried), ♀.—Body discoloured dull pitch-black. Wings talcose, transparent,

slightly dimmed with very light sepia-greyish; neuration pitch-brown. Fore legs and hinder femora greyish black; hinder tibiæ and tarsi greyish white. Setæ dull whitish. Length of body (shrunken) 4; wing 8; setæ about 8 mm.

Hab. Cordova, Argentine Republic (Mus. Comp. Zool. Cambridge, Mass.).

CÆNIS, Steph. 1835.

Illustrations. Adult (details), Pl. XV. 26 *a, b*; (whole figures) Steph. (1835) under *C. halterata (macrura)*, and Pictet under *C. halterata (grisea)* and *lactella* (\ddagger *lactea*). *Nymph*, Pl. XLII.

Adult.—Hind wings absent. Caudal setæ 3, mutually subequal; the median being sometimes a little longer or shorter than the others, which in ♂ im. are from $3\frac{3}{4}$ to 5 or 6 times as long as the body, and in ♀ about $\frac{3}{4}$ as long as it; in neither sex are the setæ of the subimago much more than $\frac{1}{2}$ as long as the body, and therefore their joints in the ♂ undergo excessive elongation during the last moult; in ♂ im. they are uniformly glabrous, but in ♀ im. the setæ are pubescent from near their roots to the tips. Cross veinlets almost exclusively uniserial, remote from the margin and absent from the marginal area; terminal and inner margins of the wings devoid of rudimentary veinlets; no branchlets to the longitudinal nervures. The anal-axillar interspace contains two long intercalar nervures of nearly equal length, either of which is met by the other just before annexing itself to the anal (8) nervure near the series of cross veinlets, and at a distance from the inner margin of about $\frac{3}{5}$ of the interval between its own extremity and the costa; the fork formed by their conjunction is narrow and deep, and the curvature of its sides nearly uniform. The recurrent membrane of the wing-roots does not extend beyond the scutellum. Homologue of the forceps-basis undeveloped in ♀.^{f. 319} Pleuræ prolonged posteriorly in segments 7, 8, and 9 of the abdomen into setaceous-acuminate or subulate teeth. Forceps-basis entire; forceps-limbs jointless and short; penis exposed, undivided, without apparent stimuli. Ungues of the hinder tarsi of ♂, and of all the tarsi of ♀, each unlike the other; those of the ♂ fore tarsus alike, rotund. Fore tarsus of ♂, exclusive of joint 1, about $\frac{2}{3}$ as long as the tibia, which is about twice as long as the femur; its joints in diminishing order rank 2, 3 subequal to 4, 5; joint 1 is not distinctly marked off from the basis. Fore tarsus of ♀ 4-jointed, about $\frac{2}{3}$ as long as the tibia; this and the proximal joint of the former together are very little more than $\frac{3}{4}$ as long as the femur. Hind tarsus ♀ $\frac{4}{7}$ as long as the extreme length of the tibia; its joints rank 4 (the terminal), 1, and 3 subequal to 2. The theoretical first joint in these tarsi is undeveloped; the femoræ are relatively broad. During quiescence the *subimago* stands upon all its feet, with the caudal setæ laid together, and the wings usually widely outspread, rarely erect. *Nymph.*—Body broadest at about the mesothorax, but not so in a marked degree; head a little narrower than the pronotum, varying slightly in contour with the species. Pronotum transverse, its lateral borders sometimes dilated, and prolonged somewhat in front. Abdomen narrowed gradually in its hinder half, the anterior segments differing little from one another in breadth; 1st ventral segment thoracoid, 2–5 shorter than the succeeding segments; ventral segments 2–6 together about as long as 7–10 together; pleuræ dilated, posteriorly acute or acuminate. Tracheal branchiæ

placed as in *Tricorythus maximus*, and of a very similar character, but the laminæ of the hinder pairs are more rounded in form, and are not provided with an appendage on their under surface. Moreover the elytroid pair are beset with short pubescence on the upper surface, and ciliated with fine hair along their lateral and posterior borders; the pairs succeeding them are membranaceous, and their fringes are subdivided more sparingly than in *Tricorythus*, the fibrils of the costal border and of the proximal portion of the inner border of each lamina being simple or only bipartite, instead of pectinate, and those of the distal margin having only two or three short branches apiece, arranged unilaterally. Caudal setæ about $\frac{3}{5}$ as long as the body, beset at the joinings with fine rigid hair arranged pinnately. The hairs of *Cænis* are not flattened like those described under *Tricorythus*. Hind leg the longest; the tarsus (claw excluded) about as long as the tibia. Femora slender, or broad, according to the species. Antennæ of moderate length; joint 2 rather long and pubescent; the remainder of the flagellum beset at the joinings with minute spreading hairs.

Type. *C. halterata* (in *Ephemera*), Fab.

Distribution. Northern Europe and America, southwards to Egypt (Savigny), Mogador (undescribed sp.), and Florida; lakes of East Central Africa; Cape Town (undescribed sp.); and the Indo-Malay region.

Etymology. A mythological proper name.

The adult flies take wing during the cool of the day, and during the warmer hours of the night, when light is attractive to them. Their life is fugitive in dry air. The Cape Town and Mogador species were found there by me in 1874 and 1881 respectively; but in each case only a single drowned adult ♀ was obtained. I have seen nymphs of *C. dimidiata*, *halterata*, *Harrisella*, and of some Portuguese and Italian species alive. My discovery of the nymph occurred at Cambridge in the spring of 1866; but the genus and species (*C. dimidiata*) of the specimen captured were not ascertained until a year or two later.

CÆNIS DIMIDIATA, Steph. Plate XV. 26.

?*Ephemera minima*, Linn., Syst. Nat. ed. v. p. 62 (1747); Mül., Zool. Dan. Prodr. 142 (1776); Schr., Fn. Boica, ii. pars ii. 198 (1798).—[*Ephemera*] or *E. horaria*, Linn., [Act. Upsal. (1736), p. 27; *id.*, Fn. Suec. ed. i. no. 754 (1746)]; *id.*, Syst. Nat. ed. x. i. 547 (1758); *id.*, Fn. Suec. ed. ii. 376; [Geof., Hist. Abreg. d. Ins. Paris, ii. 240, no. 8 (1764);] Pontop., Naturh. Dan. 223 (1765); Linn., Syst. Nat. ed. xii. pars ii. 907 (1767); Fab., Syst. Ent. 304 (1775); Mül., Zool. Dan. Prodr. 143 (1776); Fab., Sp. Ins. i. 358 (1782); Fourn., Ent. Paris, ii. 352 (1785); Fab., Mant. Ins. i. 244 (1787); Berkenh., Outl. Nat. Hist. Gt. Brit. & Ireland, ed. ii. i. 150 (1789); Vill., C. Linn. Ent. iii. 20 (1789); Gmel., Linn. Syst. Nat. ed. xiii. i. pars v. 2630 (1790); Ros., Fn. Etrusc. ii. 9 (1790); Ol., Encycl. Méth. vi. 419 (1791); Fisch., Vers. e. Naturgesch. v. Livland, 566 (1791); Fab., Ent. Syst. emend. iii. pars i. 71 (1793); Schr., Fn. Boica, ii. pars ii. 199 (1798); Cederh., Fn. Ingricæ Prodr. 135 (1798); Walek., Fn. Paris, ii. 10 (1802); Lat., Hist. Nat. ed. ii. 226 (1817).—*E. plumosa*, Mül., Zool. Dan. Prodr. 142 (1776).—*E. albipennis*, Atkinson, Zoologist, i. 272–5 (1843).—*E. lactea*, Landois, Jahresb. Westf. Prov. Ver. f. Wissensch. u. Kunst. (1878), 3.

?*Brachycercus minima*, Curt., Lond. & Edinb. Phil. Mag. ser. 3 (1834), 122.

Cænis dimidiata, ! Steph., Ill. Brit. Ent. vi. 61 (1835); Pict., Hist. Nat. Névropt. ii. Ephém. 286

(1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. 582 (1853); Hag., Ent. Ann. (1863), 12; Oulianine, Neuropt. & Orthopt. of Prov. of Moscow, p. 27 (1867); ! Etn., Trans. Ent. Soc. Lond. (1871), 95, pl. ii. 4 [ala] & v. 5 [genital. ♂]; Hag., *op. cit.* (1873), 397-9; Mocsáry, Rev. d. Inhalte der Termeszterajze Fuzetek, ii. 124-5 & [German text] Naturh. Heft ii. Bd. ii. u. iii. 181-2 (1878); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 80 (1878).—*C. brevicauda*, ! Steph., Ill. Brit. Ent. vi. 61 (1835); Pict., Hist. &c. 286 (1843-5); Walk., List &c. 582 (1853).—*C. pennata*, ! Steph., Ill. Brit. Ent. vi. 61 (1835); Pict., Hist. &c. 286 (1843-5); Walk., List &c., 583 (1853).—*C. lactea*, Gerstäcker, Handb. d. Zool. ii. 61 (1863); Hag., Stet. Ent. Zeit. xxvi. 229-32 (1865); id., Trans. Ent. Soc. Lond. (1873), 397.

Orycypha lactea, Burm., Handb. d. Ent. Bd. ii. Abth. ii. 796 (1839).

?*Cloë horaria*, Ramb., Hist. Nat. d. Ins. Névropt. 299 (1842); Pict., Hist. Nat. Névropt. ii. Ephém. 270 (1843-5); Oulianine, Neuropt. & Orthopt. of the Prov. of Moscow, p. 29 (1867).

?*Cloëon horaria*, Walk., List of Neuropt. in Brit. Mus. 576 (1853).

Subimago (living).—Wings greyish white, with the marginal and submarginal areas tinted with warm sepia almost to their extremities. Setæ white.

Imago (living).—Head and pronotum fuscous, antennæ white. Meso- and metathorax piceous. Abdomen whitish, varied with grey; in ♂ white above, with markings corresponding in position with those of the ♀, but only faintly tinged with grey; in ♀ cretaceous, with segments 1-5, and sometimes the extreme base of 6, grey above, but with this colour broadly interrupted at the joinings by the ground-colour, and widely so in the middle of segment 1; moreover the patches of grey are intersected by a fine longitudinal cretaceous line, and are invaded by the same colour in the neighbourhood of the pleuræ, where a series of grey dots is distinguishable, placed singly in the segments close to their anterior lateral angles; the dots are present also in the hinder segments, which otherwise are uniformly cretaceous. The ventral segments of ♀ are often marked on each side with a grey dot. The ♂ genitalia are pale throughout, and when dried have a light yellowish testaceous tint. Setæ white. Fore leg in some lights tinged with Roman sepia-grey, and with femur simply grey, becoming when dry whitish with the femur bistre- or light sepia-grey in ♀, and greyish or brownish grey in ♂. Hinder legs greyish white (the ♀ with yellowish-white femora when dried), with a black dot on the upper edge of the femur a little before the knee, visible also on the ♀ fore femur. The stronger portions of the longitudinal nervures, and the usual coloured part of the front border of the wings, are greyish in the dried ♂ and sepia-grey in the ♀. Length of body 3-5; wings, ♂ 4, ♀ 5; setæ, ♂ im. 18 & 13, subim. 3 & 2·5-3 & 3·5; setæ, ♀ im. 3, subim. 2·25 millim.

Hab. Great Britain to Moscow, and Scania (Wallengren) to Lago Maggiore, where I have taken it at Pallanza. It abounds in Belgium and Holland, as well as in lowland Switzerland. Pastor Wallengren adopts the prevalent surmise that this was the species which Linné meant to describe as *E. horaria* in 1758. I have not adopted the name (on account of the vagueness of the diagnosis) in the absence of authentic types. Vague diagnoses are, at the most, essentially generical.

Caenis

Var. RIVULORUM, sp.n. (p. 320)

Imago (living), ♀.—Head and prothorax translucent whitish grey, varied with dark

black-grey. Meso- and metanotum light umber-brown, with black sutures. Abdomen white, segments 1-3 partly shaded above very slightly with greyish. Legs white; the fore coxa, femur, and base of the fore tibia dark grey; hinder femora white.

δ (*living*).—Similar; meso- and metanotum lighter than in the ♀, and with sutures less distinctly black. Costa, subcosta, radius, sector, and cubitus blackish grey to rather beyond the middle. Length of wing 3, setæ about 12 millim.

Hab. Dorsetshire, in the Syndeford brook, near Shedrick, in the parish of Thorncombe, Chard; also the Dove, near Mayfield, Ashburne, Derbyshire (June). I suspect this is the insect quoted as English by Pictet under *C. lactea* in 1843-5. p. 320

CÆNIS LACTELLA (renamed).

Cænis lactea, Pict., Hist. Nat. Névropt. ii. Ephém. 276, pl. xlivi. 1-4 & xliv. (1843-5); Hag., Trans. Ent. Soc. London (1873), 397.

Imago (after Pict.).—Head grey, with the vertex a little lighter. Thorax light ochreous, with the sides of the prothorax and the mesonotum fuscescent; the latter marked with a cruciform spot of the ground-colour. Abdomen white, with very slightly defined spots on the sides of the segments. Setæ whitish. Legs tinged very faintly with lutescent. Wings vitreous, colourless; subcosta and radius black; the other nervures lutescent, colourless in the ♂.

δ (*dried*).—Vertex of head pitch-brown. Thorax translucent; the pronotum rather greyer than the remainder in some lights; meso- and metanotum pervaded with a light brownish amber-colour, the metathorax viewed sideways rather yellower amber. Terminal segments of the abdomen very light yellowish amber or light brown ochreous; the remainder whitish amber, with traces of the same yellowish colour at the sides of the back; legs and setæ uniformly whitish, or whitish amber with a faint yellowish tint. Length of body, ♀ 4, ♂ (*dried*) 3; wing, ♀ 4, ♂ 3·5; setæ ♂ 11 millim.

Hab. Lakes of Geneva and Zurich, in the middle of summer. I obtained it at Geneva (1230 ft. alt.) on the 10th August, in profusion at gas lamps. Pictet's fig. 1 is a very good likeness of the living ♂ im.

CÆNIS HALTERATA, Fab. Pl. XV. 26.

Ephemera halterata, Fab., Gen. Ins. 244 (1777); *id.*, Sp. Ins. i. 384 (1782); *id.*, Mant. Ins. i. 243 (1787); Vill., C. Linn. Ent. iii. 18 (1789); Gmél., Linn. Syst. Nat. ed. xiii. i. 2629 (1790); Ol., Encyc. Méth. vi. 418 (1791); Fab., Ent. Syst. emend. iii. pars i. 69 (1793); Schr., Fn. Boica, ii. pars ii. 198 (1798); Lat., Hist. Nat. Crust. & Ins. xiii. 95 (1805); Zet., Ins. Lap. 1045 (1840); Hag., Trans. Ent. Soc. London (1873), 396.—*E. brevicauda*, Fab., Ent. Syst. emend. iii. pars i. 69 (1793); Walck., Fn. Paris, ii. 9 (1802); Lat., Hist. Nat. Crust. & Ins. xiii. 96 (1805); Zet., Ins. Lap. 1045 (1840).

Brachycercus chironomiformis, Curt., Lond. & Edinb. Phil. Mag. ser. 3 (1834), 122.

Cænis chironomiformis, Steph., Ill. Brit. Ent. vi. 62 (1835); !Etn., Trans. Ent. Soc. (1871), 94.—*C. macrura*, !Steph., Ill. Brit. Ent. vi. 60, pl. xxix. 1 (1835); Walk., List of Neuropt. in Brit. Mus. 583 (1853); Hag., Ent. Ann. (1863), 10; !Etn., Trans. Ent. Soc. London (1868), 279-82 [nymph]; *id.*, *op. cit.* (1871), 93, pl. v. 4 [details]; Hag., *op. cit.* (1873), 397; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 308 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, 80 (1878).—*C. interrupta*, Steph., Ill. Brit. Ent. vi. 62 (1835); Pict., Hist. Nat. Névropt. ii. Ephém. 287 (1843-5); Walk., List

&c. 583 (1853).—*C. grisea*, Pict., Hist. &c. 278, pl. xlv. 1, 2 (1843-5); Walk., List &c. 581 (1853); Brau., Neuropt. Austr. 25 (1857); Ausser., Ann. d. Soc. Nat. Modena, Ann. iv. 133 (1869); Joly, Bull. Soc. Hist. Nat. Toulouse, iv. 147 (1871); *id.*, Bull. Soc. d'Et. &c. Angers, 41-2, Note B (1876).—*C. halterata*, ! Hag., Ent. Ann. (1863), 11.

Subimago (living).—Wings tinted with greyish, especially towards the costa. Setæ light blackish grey.

Imago (living).—♂. Head grey-black, with the stipes of the antennæ and the cervical joining sepia-grey. Pronotum medium ivory-black; meso- and metanotum jet-black, changing to pitch-brown when dried. Abdomen of ♂ grey, tinged towards the sides with medium ivory-black; each dorsal intermediate segment has the track of the dorsal vessel, and a spot on each side of it at the base of the segment, pellucid, and each of those segments beneath has a pellucid spot on each side near the middle; the dorsal joinings of the segments are opaque, with the extreme overlapping edge of the integument whitish. Setæ grey, with light blackish-grey joinings. Legs pitch-black; the tibiæ, tarsi, and under edges of the femora light blackish-grey and translucent. Wings transparent, smoky, slightly greyish in the vicinage of the costa for some distance from the wing-roots; costa, subcosta and radius, and in some lights the other longitudinal nervures pitch-black; but viewed with transmitted light, in some positions, most of the nervures mentioned, excepting the thicker parts of the three foremost, become translucent whitish.

♀ (*living*).—Fore femur grey; hinder femora yellowish white. Abdomen above blackish grey, becoming ochreous towards the joinings and sides of the segments; venter tinged with greenish grey. Length of body, ♂ 4-5, ♀ 6; wing, ♂ 4-5, ♀ 7; setæ, ♂ im. 14 & 15-15 & 16, subim. 3; ♀ im. & subim. 2-3 millim.

Hab. Europe, from Scania and Småland (Wallengren) or Lapland (Zet.) to Portugal and Italy; and from Great Britain to Germany and Switzerland. Abundant at Cintra, 27th April (400-600 ft.); Toulouse (430 ft.); Bâle and Geneva; and near San Marcello, in the Apennino-Pistojese (2200 ft.). The form of the spot on the forceps-basis varies considerably in dried examples, and sometimes the spot disappears in drying.

CÆNIS ROBUSTA, sp. nov.

Imago (dried), ♂.—Thorax lucent raw-umber or light pitch-brown, the pronotum rather paler laterally, the vertex of the head rather redder brown, approaching light burnt-umber. Abdomen greyish white above; the joinings very narrowly grey-black, bordered narrowly with whitish at the bases of the segments; the dorsal vessel and the sides of the dorsal segments pale, the lighter space encroaching largely upon the darker in segment 7; genitalia stained slightly with brown-ochreous; venter and forceps-basis uniformly whitish; setæ white. Legs whitish; fore femur and base of fore tibia varied with sepia-grey; unguis and hinder femora whitish yellow-amber. Wings transparent, slightly smoky along the costal margin; costa, subcosta, and radius for some distance from the wing-roots dark sepia-grey.

♀. Head and thorax rather similar in colour to those of the ♂. Abdomen opaque with light greyish dorsal markings (dark grey in the subimago) upon a dull light brown-

ochreous ground-colour, of a similar pattern to those of the ♂. Setæ white. Legs nearly as in ♂, but in some lights the fore tibia and tarsus appear sepia-grey. Length of body, ♂ 4, ♀ 6; wing, ♂ 4, ♀ 6; setæ, ♂ im. about 15, subim. 2·5 & 3·3 & 4, ♀ im. 4·5, subim. 3 & 4 millim.

Hab. Holland, the IJssel, near Gouda, by the nearest lock on the way to Stein; end of July.

CÆNIS HARRISELLA, Curtis.

Brachycercus Harrisella, Curt., Lond. & Edinb. Phil. Mag. ser. 3 (1834), 122.

Cenis Harrisella, Steph., Ill. Brit. Ent. vi. 61 (1835); Pict., Hist. Nat. Névropt. ii. Ephém. 286 (1843-5); Walk., List Neuropt. in Brit. Mus. part iii. 583 (1853).—*C. luctuosa*, Pict., Hist. &c. 283, pl. xlvi. 3 (1843-5); Walk., List &c. 582 (1853); Hag., Stet. Ent. Zeit. xxvi. 229 (1865); ! Etn., Trans. Ent. Soc. Lond. (1871), 97, pl. v. 6 [forceps]; Hag., Trans. Ent. Soc. Lond. (1873), 399; Meyer-Dür, Bull. Soc. Ent. Suisse, iv. 308 (1874); Rostock, Jahresb. d. Ver. f. Naturk. Zwickau, 1877, p. 79 (1878).—*C. ‡ halterata*, ! Etn., Trans. Ent. Soc. Lond. (1868), 279-81 [nymph].

Oxycypha luctuosa, Burm., Handb. d. Ent. Bd. ii. Abth. ii. 797 (1839).

Ephemera ‡ brevicauda, Blanch., Hist. Nat. des Ins. iii. 54 (1840).

Subimago (living).—Head and pronotum greyish black; meso- and metanotum black. Abdomen light brown-ochre or light cinnamon; setæ black. Wings tinted with blackish grey; their neuration dark. Legs white, sometimes smoky white; the tarsus, tibia, and extremity of the femur of the fore leg carbonaceous black.

Imago, ♀ & ♂ (*living*).—Head and thorax pitch-black, with the sutures and pleuræ of the latter Roman sepia-brown. Abdomen Roman or warm sepia-brown, with a short dark line on each side at every joining, and pale elongated spots near the bases of the setaceous pleural prolongations of segments 7-9; forceps and setæ grey or light blackish grey. Wings whitish, with grey nervures, excepting the piceous subcosta and radius. Fore tarsus warm sepia; hinder legs light blackish grey, with the joinings black. Length of body, ♂ 6·5, ♀ 5·7; wing 5·5-6; setæ, ♂ im. 25, subim. 4, ♀ subim. 3 & 4 millim.

Hab. England, in the Kennet, near Reading, and in Somersetshire; Berlin (Burm.); St. Petersburg (Hag.); Lake of Thun (Pict.). The nymph is easily recognized by its strangely subconical ocelli: on one occasion I caught one in the part of the Garonne flowing between St. Michel and the Île des Grands Ramiers, Toulouse. It probably flies by night.

CÆNIS OOPHORA, Kollar MS.

Cenis oophora, Pict., Hist. Nat. Névropt. ii. Ephém. 284, pl. xlvi. 4 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 582 (1853); Etn., Trans. Ent. Soc. London (1871), 97.

Adult, ♀ (*dried*).—Brilliant brown; legs lutescent, spotless. Wings whitish, with their neuration more distinct than in ordinary species of *Cenis*, and the radius stouter and darker. Length of body 4; expanse of wings 11 millim.

Hab. Sardinia (after Pictet). Described from a defective ♀ example.

CÆNIS ARGENTATA, Kollar MS.

Cenis argentata, Pict., Hist. Nat. Névropt. ii. Ephém. 279, pl. xlvi. 6 (1843-5); Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 581 (1853); Etn., Trans. Ent. Soc. London (1871), 96.

Subimago (dried), ♀.—More delicate and slender than *C. halterata* and *C. lactella*. Head and thorax grey, with silvery reflections, the prothorax a little lighter. Abdomen grey at the base and brilliant white at the tip. Fore legs grey; hinder legs brilliant white. Setæ white, faintly annulated with blackish. Wings slightly greyish, the subcosta and radius black. Length of body 4, setæ 3; expanse of wings 8 millim.

Hab. Sicily (after Pictet).

CÆNIS HILARIS, Say.

Ephemera hilaris, Say, Journ. Acad. Nat. Sc. Philad. viii. 43 (1839); Le Conte, Complete Writings of T. Say, ii. 413 (1859).

Cænis hilaris, Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 583 (1853); Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 54; Walsh, Proc. Acad. Nat. Sc. Philad. (1862), 381; Hag., Proc. Ent. Soc. Philad. ii. 179 (1863); Etn., Trans. Ent. Soc. London (1871), 96.

Imago (abstract after Say).—Thorax pale fulvous. Abdomen white; each of the apical segments with three fuscous dots on each side. Length of body 2 millim.

Hab. Indiana; September.

CÆNIS DIMINUTA, Walk.

Cænis diminuta, ! Walk., List of Neuropt. Ins. in Brit. Mus. part. iii. 584 (1853); Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 55; ! Etn., Trans. Ent. Soc. London (1871), 95.—*C. amica*, Hag., Smithson. Miscell. Coll. (1861), Synop. Neuropt. N. Am. 55.

Imago (dried), ♂.—Thorax above for the most part bronzy brown-ochreous. Abdomen whitish, varied with grey anteriorly on the back, posteriorly yellowish white; the joinings of the segments and a dark longitudinal line near the spiracular border on each side of the back in the intermediate segments black. Genitalia and setæ white. Wings transparent whitish grey; the subcosta and radius purple-black to beyond the middle. Legs whitish: the fore femur warm sepia-grey, with a dark spot above close to its distal extremity: hinder femora dull whitish, with a grey band or a black spot on their upper part just before the knee. Length of body, ♂ 2-2·5, wing 3, setæ 10 millim.

Hab. St. John's Bluff, East Florida (E. Doubleday; Brit. Mus.); Pennsylvania (Zimmermann; Berlin Mus.). By using a lens of suitable power, instead of a Coddington, I can distinguish the femoral spots or bands in Walker's type, which formerly were supposed by me to be lacking, but were mentioned by Hagen in his description of *C. amica*. He indicates perhaps a distinct species from the same locality (Pennsylvania) in the Berlin Museum, with a yellow thorax, whitish yellow abdomen, and white legs, grey at the distal extremities of the fore femur and tibia.

I have seen several other N.-American species of *Cænis*, but have left them to be described by entomologists resident in that country.

CÆNIS PERPUSILLA, Walk.

Cænis perpusilla, ! Walk., List of Neuropt. Ins. in Brit. Mus. part iii. 585 (1853); Hag., Verh. zool.-bot. Gesells. Wien, viii. 477 (1858); ! Etn., Trans. Ent. Soc. London (1871), 96.

Imago (dried), ♂.—“Testaceous;” wings transparent, the marginal and submarginal

areas, from the base of the wing to beyond the middle, faintly tinged with light grey; the subcosta and radius black. Hinder legs and setæ white. Length of body 2·5; wing 3; setæ 12 millim.

Hab. Ceylon (Brit. Mus.). The above is hardly an adequate description of the species, and therefore the name may rank as a mere catalogue name. The unique specimen is gummed upon card, back downwards, and consequently little can be added to Walker's diagnosis.

CÆNIS CIBARIA, Etn.

Cænis cibaria, ! Etn., Ent. Mo. Mag. xv. 268 (1879).

Imago (dried).—Head black, grey above. Thorax light bistre-brown, with the sutures and point of the scutellum black, and the metanotum, as well as the first abdominal segment, grey, with their distal borders black. Abdomen of ♂ in segments 7–10, and of ♀ throughout blackish grey, with the joinings and sides of the dorsum widely whitish, and with segments 2–6 of ♀ less dark; these segments are whitish in ♂, and so also, sometimes, is the track of the dorsal vessel in the dark segments; venter uniformly pale. Legs whitish; the outer side of the coxae, and a large triangular preapical spot or abbreviated streak on the upper part of the femur black. Wings vitreous, with the coarser nervures and the interjacent cross veinlets more or less opaque blackish-grey. Length of body, ♂ 2·5–2·75, ♀ 4·0; wing, ♂ 2·0–2·75, ♀ 3·0 millim.

Hab. In company with *C. kungu*, 25th January, 1877 (H. B. Cotteril).

CÆNIS KUNGU, Etn.

Cænis kungu, ! Etn., Ent. Mo. Mag. xv. 268 (1879); cf. Elton, Travels . . . East. & Cent. Africa, p. 292 & Append. p. 415 (1879) [no descript., but note of habits].

Imago (dried).—Head and thorax light brown-ochre, or furfuraceous above, and very light yellow-ochre beneath; abdomen yellower, with the joinings pale. Femora brown-ochreous, the fore tibia of ♂ light blackish-grey, the tarsi and hinder tibiæ whitish. Wings vitreous, in ♂ very faintly tinted towards the costa with light warm sepia-greyish; the costa and a few of the neighbouring nervures, with the intervening cross veinlets, pitch-black, becoming with change of light warm sepia-brown where they are thinnest. Length of body, ♂ about 3·5, ♀ 4·5–5·0; wing, ♂ 3, ♀ 3·5–3·75; setæ, ♂ subim. 1·75 millim.

Hab. Lake Nyassa, about the middle of the lake, between Livingstonia and Makanjeras, 25. i. 1877 (H. B. Cotteril). The packet containing specimens of this and *Cænis cibaria* (*supra*) was endorsed "Edible midges, which the natives of Nyassa make into cakes," sold in their markets by the name of "Kungu." The specimen of Kungu examined by me was composed almost exclusively of a species of the *Culicidæ*; and therefore it is probably made of whatever mild-flavoured insect happens to be in sufficient profusion at the place and time of its manufacture.

Section 8 of the Genera.—Type of *Prosopistoma*. *Adult.*—Similar to *Cænis* and its allies, but with 4 wings instead of 2 only. Figured by Vayssiére under very disadvantageous circumstances; the figures consequently do not admit of exact comparison. *Nymph.*—Fore wings immersed in a notal shield, which conceals the tracheal branchiæ and most of the abdomen: pronotum undefined. Palpus of maxilla 1. 4-jointed, longer than the lacinia; the latter nude on the crown, armed with a few strong spinous teeth at the tip and a few setulæ on its inner side. Labium not differentiated into lobes and laciñiæ of second maxillæ. Hinder lateral angles of abdominal segments dilated and produced. Natation agile, effected by the setæ exclusively (which are capable of complete retraction into the interior of the abdomen), the legs being closely folded up.

PROSOPISTOMA, Lat. 1833.

Illustrations. *Subimago* (details), Pl. XV. 27 (after Vayssiére, 1881). *Nymph*, Pl. XLIII.; see also citations under *Binocle*, Geoffroy (1764), *Prosopistoma*, Joly (1872, Sept., and 1876 Mars), Westwood (1877), and Vayssiére (1881).

Subimago (in alcohol).—Wings 4; hind wings with the costal shoulder placed close to the wing-roots; neuration in both wings plentiful, but no cross veinlets are delineated. Hinder ocelli relatively much smaller than in *Cænis*. Abdomen proportioned somewhat as in *Cænis*, with the pleuræ of segments 7-9 similarly produced into slender points; the ventral lobe of ♀ segment 9 entire and truncate. Caudal setæ of ♀ $\frac{1}{3}$ as long as the body. The recurrent membrane of the fore wing-roots does not extend beyond the point of the scutellum. ♂ and adult fly unknown. Proportions of legs not ascertained (after Vayssiére, 1881). *Nymph.*—Broadly ovate, tapering posteriorly, flattened beneath, and highly convex above. Notal shield imperfectly peltate, being excised in front and behind to fit with extreme exactitude the adjoining surfaces of the head and 7th abdominal segment; laterally its borders are broadly expanded, flattened beneath, and truncate obliquely in front and behind; dorsally, along the median suture, a narrow depression or shallow furrow is apt to be produced, the integument thereabout being apparently of a texture sufficiently yielding and elastic to allow considerable variation in the definition of the furrow. Possibly this part may be concerned in some way with the transfusion of water through the branchial chamber underlying the shield; but this is merely my conjecture. At the hinder extremity of the median suture, a small aperture is discernible at the edge of the shield, affording an exit from the branchial chamber. The plastron (so to speak) truncate in front and behind, and narrowed in advance of the metasternum, is slightly countersunk in relation to the sternum and traversed by shallow grooves for the lodgment of the legs when they are folded up during adhesion or natation. The sutures of the mesosternum, with the pro- and meta-sterna, are liable to become effaced in alcoholic specimens; neither the artist nor myself could distinguish them in the subject of Pl. XLIII. The sternum terminates behind in an acuminate point, very near the margin of the plastron, and has a very smooth flattened surface. A narrow ovate aperture exists on each side of the plastron close to the acute hinder angles;

through these inlets the water enters the branchial chamber. Head transverse, flattened beneath, arched in front and above. Labrum small. Mentum oblong-oval, crenulated behind, and with a truncate-triangular median excision in front, into which the labium fits closely. The labrum and epistoma, with the labium and mentum, enclose the remaining mouth-parts completely, and often conceal them. Antennæ short, subulate, 6-jointed; the joints in order of diminishing length rank 3, 4, 5, 6 subequal to 2, and 1; joint 1 is the stoutest, and joint 3 is nearly as long as all the others put together. Mandible tapering from a broad oblique subtriquetrous base to a pungent tridentate crown; fangs conical, the intermediate very little smaller than the others, just below the bases of which the edges of the crown are minutely denticulated; endopodite strong and relatively long, subcylindrical, bidentate at its extremity, with a row of denticulations on each side just below the fangs; its base is immediately preceded by a tuft of velutinous or puberulose setæ [their puberulence is not distinguishable in a figure drawn to a scale of enlargement as low as 90], about 5 in number, and rather longer than the endopodite; molar region absent. The mandibles, as well as the 1st maxillæ, are virtually symmetrical; the latter terminate each in 4 strong, flattened, acuminate, chitinous teeth, the innermost of which are the strongest, and have 2 or 3 microscopically puberulose setæ close to their inner base; a short, solitary, smooth setula arises from the inner face of the lacinia near the transverse suture; the palpus, geniculated at the first joining, has the proximal joint strongly reflexed; its joints in sequence of lessening length rank 3, 1, 2, 4; the first two are stout, the others slender. Labium truncate-obtriangular, slightly rounded off at the corners, and bevelled at the sides to fit into the gap in the mentum; tongue and laciniae of 2nd maxillæ absent; palpi geniculated, tapering distally, the proximal joints divaricate, and each nearly as long as the next joint. The joinings of the anterior ventral segments are sometimes dimly discernible through the plastron. Dr. Vayssièr describes and figures (1882, figs. 106 & 108) 5 pairs of obtected tracheal branchiæ; his figures should be consulted. Caudal setæ plumose, indistinctly articulated, and about $\frac{2}{3}$ as long as the body. Legs slender; the fore tibia, in about $\frac{1}{2}$ its length from the tip, is armed interiorly with a row of articulated spines, denticulated on their inner sides. Hind leg rather the longest; the tarsus (claw excluded) less than $\frac{1}{2}$ as long as the tibia; this last about $\frac{3}{4}$ as long as the femur.

Type. *P. variegatum*, Lat.

Distribution. Rivers of continental Europe, and Madagascar.

Etymology. προσώπιον and στόμα, from the mouth-parts being well concealed by the large mentum &c., as with a little mask.

PROSOPISTOMA FOLIACEUM, Fourcroy. Pls. XV. 27 [wings, after Vayssièr] & XLIII. [nymph].

Le Binocle à queue en plume [Hist. abrég. des Ins. de Paris, ii. 660, pl. xxi. 3 e. f. g. (1764)]; Geoff., op. cit. ed ii. loc. cit. (1785) & ed. iii. (1799).

Binoculus foliaceus, Fourcroy, Ent. Paris, ii. 539 (1785).—*B. pennigerus*, Lat. Hist. Nat. Crust. & Ins. iv. 122 (1802).—*B. pisciforme*, Duméril, in Dict. Sc. Nat. iv. 106, Paris, Lenormant, art. *Binocle* (1816).

Limulus pennigerus, Müll., Entom. p. 127, no. 62 (1800?) [cited by Lat. 1802].

Prosopistoma punctifrons, Lat., Nouv. Ann. du Mus. (3), ii. 33 (1833); *id., op. cit.*, iii. 40 (1843); Lucas, Dict. Univ. Hist. Nat. d'Orbigny, ed. ii., art. *Prosopistoma* (1869); Joly, Rev. d. Soc. Savants (2), v. 4–6 (1870)?; *id.*, Mém. Soc. Nation. Sc. Nat. Cherbourg, xvi. 329–336 (1871); Mül., Ent. Mo. Mag. viii. 227 (Feb. 1872); *id.*, Zoologist, 2955 (1 Feb. 1872); *id.*, Proc. Ent. Soc. London, 1st Jan. 1872, p. xlvi. (19 Feb. 1872); Westw., Athenæum (Feb. 24th, 1872); N. Joly, Mém. de l'Acad. des Sc. Inscript. et Belles-lett. de Toulouse (7), vol. iv. Bulletin, pp. 437–438 (1872); *id., op. cit.* pp. 440–441 (Mars, 1872); *id.*, in Le Progrès Lib. de Toulouse (19 Mars, 1872); Westw. & McLach., Ent. Mo. Mag. viii. 279 (1 April, 1872); *iidem*, Proc. Ent. Soc. London, 19 Feb., p. vi. (April 1872); E. & N. Joly, Ann. d. Sc. Nat. (5), Zool. xvi. Art. no. 7, pp. 16, pl. xiii. 1–16 (Sept. 1872); McLach., Ent. Mo. Mag. x. 109 (Oct. 1873); *id.*, Rep. Brit. An. for 1873, p. 118 (1874); *id.*, Journ. Linn. Soc., Zool. xii. 145 (1874); Joly ('Separate' of), Rev. des Soc. Sav. (2), iii. 69–72, p. 7, Note E (Digne Dec. 1874); N. & E. Joly, in Le Prog. Lib. de Toulouse (17 Mars, 1875); *iidem*, Mém. de l'Acad. des Sc. Inscript. & Belles-lett. de Toulouse (7), vii. 606–607 (1875); Joly, Feuil. d. Jeun. Nat. v. 68 (1875); *id., op. cit.* vi. 53–54, pl. ii. 1–5 (Mars 1876); *id.*, Bull. Soc. d'Etudes &c. d'Angers, 1874–5, pp. 44–45, Notes E & G (1876); N. & E. Joly, Rev. des Sc. Nat., Montpellier, v. 307 &c., pl. viii. 32 [tracheal branchiæ] (Dec. 1876); Westw. Trans. Ent. Soc. London (1877), 189–194, pls. iv. B 1–5 & v. 1–12 [after Joly]; Joly, Ann. Soc. Ent. Fr. (5), viii., Bull., pp. 70–71 (Avril 1878); *id.*, Feuil. d. Jeun. Nat. no. 92, pp. 99–100 (Juin 1878); Joly & Vays., Compt. Rend. des Séanc. de l'Acad. des Sc. Paris, lxxxvii. 263–5 (Août 1878); Joly, Pet. Nouv. Ent. ii. no. ccv. 265 (Oct. 1878); *id.*, Feuil. d. Jeun. Nat. no. 98, pp. 24–25 (Dec. 1878); Joly & Vays., Bull. Soc. d'Etud. Sc. Nat. Nîmes, no. vi.–vii. (1878); Joly, *op. cit.* (1879), pp. 3–7; *id.*, Proc. Ent. Soc. Fr. (1880), Bull. no. xi. 109; *id.*, Bull. Soc. d'Etud. Sc. d'Angers, 1878–9, pp. 157 note 2, 158 note 1, 164 notes, 167 Note B (1880); Vays. Ann. des Sc. Nat. (6), Zool., xi. 1–15, pl. i. 3–17 (1881) [nymph, subim., & details]; *id., op. cit.* xiii. 77, pls. vi. 57, x. 105–109, xi. 104 & 110–114 [nymph and details] & 116 [diseased nymph] (1882).—*P. folia-ceum*, Lucas, Ann. Soc. Ent. Fr. (6), ii., Bull. Ent. xcv. (Sept. 1882).

Chelysentomon or *Ch. pennigerum*, N. & E. Joly, in Le Prog. Lib. de Toulouse (Fev. 1872); *iidem*, Mém. de l'Acad. des Sc. Inscript. & Belles-lett. de Toulouse (7), iv., Bull., pp. 437–438 (Fev. 1872); N. Joly, in Le Prog. &c. (19 Mars, 1872); *id.*, Mém. de l'Acad. &c. (7), iv., Bull., 440–441 (1872); N. & E. Joly, Mém. de l'Acad. &c. (7), iv., pl. figs. A–G & R (1872); *id.* Compt. Rend. Paris, lxxiv. 1413 (1872).

♀ *Subimago (in alcohol)*.—Wings dark iron-grey, especially the anterior. Body reddish brown, darker above than beneath, and pale at the insertions of the legs. Length of body 3·78, wing 4·85, setæ 0·42 millim. (Vayssièvre).

Hab. France; the Garonne near Toulouse, chiefly to the right of île des Grands-Ramiers, not far from the powder-mills below the Pont d'Empalot (Joly); the Rhone at Avignon (Vayssièvre); the Seine above Paris (Geoff.), in the neighbourhood of Epône, Mantes, Bas-Meudon, and Point-du-Jour (Lucas). Germany: the Rhine at St. Goar, between Coblenz and Mayence (Dr. Noll, teste Prof. Leydig). Bohemia, in the Moldau, a tributary of the Elbe (Purkinje, teste Blanchard & Joly). The nymph inhabits swiftly flowing water from a few inches to 6 ft. deep, harbouring in irregularities of the under surface of rough stones, and shunning the light. It swims with agility, propelled solely by the caudal setæ, holding its legs closely folded up under the body. When desirous of repose, it is able to attach itself by adhesion, like a *Patella*, to a smooth surface; the joinings of the segments and of the head and thorax are then tightly contracted, to

prevent leakage, and the caudal setæ withdrawn more or less completely into the visceral cavity. The terminal segment also is partly retractile. What appear to be the perineal lobes form with the dorsum of that segment the extremity of the sheath of the setæ; and whilst these are passing into its aperture during retraction, the fringes of each seta collapse upon the rhachis successively. Dr. Vayssi  re conducted me to the river at Avignon, and captured a specimen without entering the water,—the only one that I have seen alive. He reared the *subimago* early in June at Avignon, and states that the fly is nocturnal.

About fifty literary references to *P. foliaceum* are cited above; of these only one relates to the subimago and egg, all the others to the nymph exclusively. The most important of them are Vayssi  re (1881 & 1882), Joly (1872, Sept.), and Westwood (1877, Oct.). This catalogue of *Prosopistoma* literature is very nearly exhaustive, and although many of the passages cited are tautological, yet the reiterated statements are not verbatim reprints of one another. Some of the 'Notes' designated by capital letters are special additions to the extracts reprinted as 'Separates.'

PROSOPISTOMA VARIEGATUM.

Prosopistoma variegatum, Lat., Nouv. Ann. du Mus. d'Hist. Nat. (3), ii. 23 (1833); Gu  rin-M  n., Ic. R  g. An. iii. 40, pl. xxxv. 4 (1829-44); Westw., Proc. Ent. Soc. Lond. (1872), p. vi.; *idem*, Trans. Ent. Soc. Lond. (1877), pp. 189-194, pl. iv. B 1-4.

Hab. Madagascar. Length of body of nymph 6 millim. (Latr.). An undescribed species.

In accordance with my usual custom, I refrain from passing criticisms upon the work of previous authors, preferring that it should be understood that where our conclusions may happen to differ upon any point concerning *Prosopistoma*, my not concurring with their opinions respecting it is not due to oversight of their observations.
